approach

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DETROIT PUBLIC
MAY 14 1962
TECHNOLOGY & SCIENCE

MAY 1962

are
you
REALLY
ready
to
lead?

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LET ME LEAD

It's been quite a few months now, since you got those wings of gold and a promotion just arrived. And let's see, there must be about 600 hours in the ole log book, with time in model to burn—all of 150 hours.

There's no question about it, you've followed a tough road all these many months but the reward was worth it—squadron duty. There is just one thing wrong. You're tired of being "chased" and flying wing. It's time you got out in front!

But maybe, just maybe, nothing is wrong with the system. Maybe you could stand a bit more seasoning. There is more to leading than qualifying aboard the carrier or gunnery or instruments: These are individual accomplishments.

It may be that "Cuzzin Weak-Eyes" who leads your flight is an old woman for always asking "what state" insisting on flight integrity, or holding up the launch with his long-winded briefing. It may also be that he has built up a "depth of experience" which can recognize a shaky setup and take corrective action *before* the trap is sprung. Like the cigarette ad: "It's what's up front that counts."

Troubles which beset a "young" flight leader often appear when the choice of action is not clear cut and he begins to grope in the grey areas for his decision. Failing to recognize or forgetting that the chain of flight integrity is only as strong as the weakest link is another situation which produces difficulty.

Occasionally there is even a casual attitude toward the responsibility of "being out in front." For this we have the example of two A4Ds in a steep port turn with the wingman to starboard. In the process of an attempt to *change the lead* the wingman's vertical stabilizer struck the nose section of the lead aircraft. How careless can you be?

How do some of these "decision-making" troubles start?

Ask a section leader who was to use live ammo in a close air support training mission. The airplanes were loaded with one 500-pound general purpose bomb, two 100-pounders, plus 20 millimeter ammo for strafing. The leader's briefing, preflight and conduct of the flight to the target area were normal and left no room for criticism.

Squadron SOP required the 500-pounder to be released out of a 45-degree glide at 3700 feet above the target with recovery complete by 1500 feet above the target. But upon arrival at the target area, which was about 5000 feet above sea level, the ground control agency reported deteriorating weather with present ceiling only 1500 feet above the target level. Obviously the briefed delivery could not be used and it was time for a decision.

The leader could cancel the bombing and carry out the strafing but another factor may have influenced his thinking. Prior to commencement of flight operations, all pilots had been told of the presence of a VIP party in the vicinity of the target area who would be observing the live ordnance missions.

He chose to deliver the bombs.

Unfortunately, the technique he used made the pullout considerably below the 1500-foot minimum for 500-pound bombs. Completing three bombing runs, the flight was on a second strafing run when the leader reported failure of his number two flight control system. An immediate return to base was made. Enroute, the wingman checked the leader's aircraft and saw no visible damage but did notice fuel and hydraulic fluid streaming from the wing and tail section.

Upon examination on the ground some 35 holes in the airplane were counted. Detonation of the 500-pound bomb appeared to have been almost directly beneath the aircraft and damage was caused by shrapnel and lava rock.

The accident report could hardly have vindicated the leader's decision when it contained such statements as: ". . . elected to drop live ordnance under unsatisfactory weather conditions . . . desire to complete the squadron's assigned commitment which completely overshadowed caution and good sense."

Overtaxing the skill of a wingman is another way to start trouble. Fortunately, the greater percentage of such situations struggle through to a "hairy tale" ending and are told in the readyroom,

By

Major C. H. (Blackie) Coppedge, USMC

At the end of a long hop the Flight Leader must begin adding up fuel, terminal weather, proficiency of his wingmen and come out with a correct answer.

not to an Accident Board. One situation which did *not* end in a "near miss" cost two A4Ds and one pilot.

2

This wingman had a little over 300 jet hours with 45 hours in the A4D of which 2.4 were at night. He had not previously flown a chase position at night in the A4D but on his third night hop he found himself in that position when the leader made a penetration and practice GCA.

The wingman "stepped down" to check the area ahead and had commenced to drop back when he noticed the lead aircraft execute a right turn and nose down.

He was on the inside and matched the turn but noticed he was closing the lead and reduced to idle power. However, he was unable to avoid contact with the lead plane. Finding himself inverted and unable to roll his aircraft upright, the wingman ejected successfully.

It is a rule of thumb that a chase pilot should be able to "trail in" on any maneuver performed by the lead aircraft without prior warning. However the accident report noted that acceleration and deceleration characteristics of jet aircraft and the ability of an inexperienced chase pilot to discern relative movement at night could not be overlooked as possible reasons for the collision.

Overextending physical limits was given as a contributing factor in another flight leader/wingman accident. Two jet pilots had an extended cross-country navigation hop approved which listed Memphis as an RON. Both of them put in a routine day at the squadron and launched on the cross-country after dark. Shortly after midnight they arrived at Memphis but sometime after pulling into the chocks a change in plan took place—rather than stay overnight, it was decided to push on to the next intermediate destination, 2.5 hours further on.

While the aircraft were serviced the pilots obtained breakfast at the galley. Two and a half hours after landing at Memphis they were ready to go again. At this point the leader had no sleep in the preceding 17.5 hours; the wingman no sleep in the preceding 18.5 hours. Now a lot of people put in 18 hour days without anything happening to them but for night jet flying this is stretching it pretty thin. If squadron supervisory personnel had known the flight leader was going to ignore his planned RON, it is not very likely that the cross-country request would have been approved.

The leader was airborne at 0320 on an individual takeoff. Three minutes later the wingman collided with the leader in a badly handled rendezvous. The wingman ejected successfully and the leader landed safely.

In their statements about how the accident could have been prevented, neither of the pilots mentioned fatigue as a possible factor and that adhering to their planned RON might have eliminated this. Both the Accident Board and Squadron CO felt otherwise.

There are plenty of other specific instances where a flight leader has had to shoulder blame for a mistake in the formation. Some of the following

may give you an idea of what happened.

- Flight leader placed his wingman in a position where the aircraft limitations could easily be exceeded.
- Flight leader failed to consider the experience level of his wingman.
- Since the flight leader placed an inexperienced wingman at the margin of the performance envelope for the aircraft, supervisory factor is considered a contributing cause.
- It is recommended that flight leaders show more consideration for their wingmen, realizing their limitations and capabilities in marginal weather conditions.
- A limited contributory factor is supervisory error in that the flight leader briefed the flight utilizing a procedure not contained in the squadron tactical doctrine.
- Adherence to standard operating procedures and flight briefings cannot be overstressed. This is especially true at night when any deviations from the briefed flight may be more difficult to detect and correct than during daylight conditions.
- Note is made of the ambiguity of the flight leader's radio transmission in which he attempted to pass the lead to his wingman (under instrument conditions).

So, in all fairness to your future wingmen, are you *really* ready to lead? Do you have all the answers at your fingertips, or are you still caught unawares by your airplane—like wondering why your bird lost ground on that pullout when you made a high side run on the target with burner on. Maybe it's because in a dive with A/B going the thrust vector is downward and it takes more airspace to round off the pullout.

Okay, you have the plane under control. How about control over yourself? Does a conservative entry to the break make you impatient—@#$%¢&* Leader, always 82 percent and 300 knots . . . And his turn on final is like a transport approach . . . So he flew in World War Deuce and Korea . . . Big deal! . . . He's just in a rut! You are flying fighters. Burn into the pattern and bend the bird around. Make those staff pilots sit up and take notice!

Oh, oh, careful boy. The gate to that road is wide, but it's a downhill grade. At the bottom are flight leaders who didn't identify nav aids after cranking in a frequency, didn't figure on extra distance for a landing roll on wet runways, didn't have fuel to the alternate when the destination folded, etc.

What it all boils down to is this: A section leader must fly (and think) for two aircraft, a division leader must do the same for four aircraft, and so on. When you can begin thinking outside the confines of your personal cockpit, you're on the way to leading.

And then when you are finally designated you'll not be a "kick the tire—light the fire—first one off is the leader—we'll brief on guard" type of jockey!

Problems of flight leadership are magnified when independent sections or dissimilar models of aircraft must work together on the same mission.

Our product is Safety, our process is education, and our profit is measured in the preservation of lives and equipment and increased combat readiness.

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Did I Die in Vain?

By LCDR Bill Barron

"BURRING? . . ." "Oh, Brother! That darn clock has to go off just when I was beginning to get comfortable. Never again . . . I've just got to get to bed earlier . . . I'm just not as young as I used to be . . . So many things to running an outfit like mine . . . Oh well, let's get some food in this machine I live in and get to work on time . . . If I find someone in my parking place again, I'll . . . well, I'd like to anyway, but I have to keep my reputation of being a good Joe.

"Good morning gentlemen . . . No, I haven't time right now, will you send my coffee to my office, I have a meeting at 0930 and I have a lot to do before then. . . . Guess I'd better wade through some of this paper work before my incoming basket has a structural failure from excess weight.

"Great shades of pink! Why in blazes do I have to approve a request for 24 new wastebaskets for the crew's quarters . . . I'm going to have to change a few of these procedures around here one of these days . . . What's this? . . . Oh yes, it's that accident report on Roberts . . . Too bad about that boy, I heard he was expecting to be married soon . . . It's a shame . . . seems like . . ."

"Yes, sir, I think it was too, I feel even stronger . . . I don't think it was necessary . . . at least I didn't . . . you see things a little differently from here . . . But if I had it to do over . . . if only I knew then what I know now . . . Sure, I'd have been a lot more careful . . . I know, they told me to be careful, they were always telling me to be careful but they were also telling me to hurry up . . ."

"Hurry up—get going—be careful—no, no, watch out for that line! Look where you're going . . . no, no, you're doing it wrong, this is the way . . . See? Now, you do it."

"They had a job to get done and I was one who had to help do it. I liked the work, it was thrilling because it's dangerous . . . but I wish now that they would have given me a little more training in it before expecting so much of me . . . Yes, I know, they were short handed and they had a schedule to meet . . . Someone told them it had to be done . . . They couldn't say, 'We can't do it, we're not ready?' . . . That wouldn't sound right . . . and it just isn't done . . . at least that's what I've heard . . . I didn't get a chance to learn too much about the Navy . . . only joined up 8 months ago . . . Gee, it would have been 8 months exactly only 2 more days from now . .

"But still . . . they tell me up here that it is a new Navy now and things have changed . . . They used to say, 'It's just part of the operations. It's dangerous and we have to expect some loss of life . .' But now they tell me that efforts are being made to correct that attitude . . . that it's really not necessary for lives to be lost just because an operation is dangerous . . . That sounds good . . . I'm glad to hear that . . . but . . . I'm up here and . . . well, I seem to contradict that statement . . . Maybe they are still learning . . . Yes, that's probably the reason . . . Now that it has happened to me they will do something about preventing this from happening again . . . They will go over their procedures thoroughly, looking for ways to improve them . . . They will be sure to find out that it wasn't only my mistake that caused this . . . They will be able to make changes now to improve their methods so that the chances of anyone else making my mistake will be greatly lessened . . . That makes me feel a little better . . . At least I didn't die in vain . .

"Look—he's reading the endorsement now . . . Let's see what it says . . ."

"All personnel have been reindoctrinated in the correct procedures, with added emphasis on safety precautions." ●

LETTERS TO THE EDITOR

Safe Flying Night Owls

FPO New York—The VS-39 *Owls* take strong exception to the pictured safety poster. While "hooting" to the tune of 1445 night hours, the *Owls* kept pace with the best of the *Eagles* by logging a grand total of 5688 accident-free hours while embarked aboard ESSEX in fiscal 1961.

L. M. HOGAN, LT
Aviation Safety Officer

● The depicted hoot owls on the safety poster are in an unwanted class of their own. Congratulations on the outstanding record of the "hoot owls" of VS-39!

Fire Dive Re-cap

FPO San Francisco—Your article "Fire Dive" (Dec. '61 APPROACH) prompts me to write of an experience in our squadron. In a recent AAR involving an FJ-4B hitting the ramp the pilot was able to free himself from the cockpit although he was engulfed in an immense fireball. This pilot was wearing an integrated torso harness, an anti-G suit and standard orange flight suit. The anti-G suit was worn outside the flight suit.

It is known that the flight suit will burn with intense heat as it did in "Fire Dive." It is also known that the nylon anti-G suit will melt when subjected to extreme temperatures. The burns received by the pilot in this case were located about the neck, arms and knees—those portions of the body not protected by the anti-G suit. Although the anti-G suit melted, the flight suit acted as an insulation to prevent further burns.

Some pilots are still wearing their anti-G suits underneath the flight suit next to the skin. (Not in this squadron.) A pilot caught in a fire dressed in this manner would have his flight suit burn first, then his anti-G suit would melt and adhere to his skin.

E. H. DAWSON JR., LT
Aviation Safety Officer
Attack Squadron 146

● The following is quoted from BACSEB 61-61, Anti-G Equipment; which was released to the Fleet about the same time we got your letter. This BACSEB cancels BACSEB 23-57.

"The coveralls are made of a relatively heavy weave nylon for the strength characteristics necessary in this garment. Cotton fibers, available to date, do not possess the necessary strength. Experiments have shown that flash burn protection is afforded by this heavy nylon fabric in most aspects equal to that afforded by treated cotton. In addition, this fabric is self-extinguishing as well as are wool and flame retardent treated cotton. However, since nylon does melt and form droplets which retain heat and can cause additional burns, it is desirable to wear an additional layer of cloth to protect against possible burns from this droplet formation. Accordingly, the following combinations are recommended:

"(1) Summer weight flight suit (flame retardent treated) over the full-garment coveralls, or the full-garment coveralls over the waffle weave underwear, Stock No. FSN D8420-270-2008 to 15 inclusive.

"(2) Cutaway coveralls over or under the summer weight flight suit (flame retardent treated).

"Experience and accident investigation have already shown that when loose fitting material is ignited, the resulting burn was far more severe than when the same material was tight fitting as in anti-g coveralls."

APPROACH welcomes letters from its readers. All letters should be signed though names will be withheld on request. Address: APPROACH Editor, U. S. Naval Aviation Safety Center, NAS Norfolk, Va. Views expressed are those of the writers and do not imply endorsement by the U. S. Naval Aviation Safety Center.

It's Mils

NAS Norfolk—During the past 5 years I have flown all models of the A4D, less the -5, with operational squadrons. As a result a good bit of time was devoted to looking at ground targets through the gunsight. Imagine my surprise, upon reading the Feb. '62 article "Practice Flameout Approaches," to find that the A4D gunsight has been converted from an angular measurement system to one incorporating linear measurement. I refer to the following excerpts, "100 to 115 mm," "100 mm ring on the horizon," "100-115 mm." Has the military abbreviation for mil become mm?

As an avid cover-to-cover reader of APPROACH, and not as a professional nitpicker, I feel that errors of this type tend to detract from the over-all excellence of the magazine.

A. R. HICKIE
Capt, USMC
FAITCLANT

● We goofed. All "mm's" should have been "mil's."

'Angel' Deck

Seattle—Your article entitled "Green Deck for Helos" in the Feb. '62 issue of APPROACH was a real hair-raiser. As a former Asst. Air Ops Officer, I can visualize with a chuckle (no malice intended) the clouds of smoke that poured down from the bridge into PriFly, CCA and Air Ops after that one.

You asked for suggestions in better terminology to prevent this. Perhaps the establishment of three deck conditions with associated terminology would help eliminate the confusion. How about the following?

1. CLEAR DECK—The landing area is clear for all types of landings
2. FOUL DECK—The landing area is not clear for any type of landing
3. ANGEL DECK—The landing area is clear for helo landings only

I feel the term ANGEL would be more appropriate than HELO or CHOPPER as the latter two could conceivably be misinterpreted as CLEAR.

H. T. BRETSCHER, LCDR
VS-721

● Your comments and suggestions are noteworthy and have been forwarded to NATOPS for consideration.

Transferring?

If you've transferred recently, or moved locally, and have a personal subscription to APPROACH, please send your change of address to Supt. of Documents, Government Printing Office, Washington 25, D.C.

Safety Contest via Crossword Puzzle

McGuire AFB—I'm enclosing a safety crossword puzzle which I believe you may find useful in the ground accident prevention program. It is one which I originated; therefore you'll have no copyright problems.

The accompanying article is more or less self-explanatory so I'll steer clear of the details of the contest in which the puzzle was used. The contest itself was most effective, highly successful and I found it an excellent means of keeping the ground accident prevention program alive between the holiday periods; Labor Day—Thanksgiving/Christmas. Of course it can be used at any time. This particular contest reached some 1500 men.

Some of the advantages which accrue from such a puzzle contest are:

(1) During the time a person is working on the puzzle he is part of a captive audience with thoughts channeled toward safety. A great number of these thoughts stay with him—the purpose of the puzzle.

(2) It puts safety on an individual basis—and stresses the individual's responsibility for safety. During the contest it was noted that small groups would gather to work on and discuss the puzzle—this is also good.

(3) While searching for a particular word for the puzzle, many safety thoughts associated with the area in question run through the contestant's mind.

(4) It promotes safety consciousness in an interesting manner.

(5) Contests, with appropriate prizes, always promote good morale. Of course, there is intrinsic profit for the winners.

The benefit to the safety program from having so many participate individually in the program, is obvious.

I can't prove that the contest was the greatest factor—however our motor vehicle accident experience and traffic violation rates dropped off sharply subsequent to the contest.

Here's a large safety return for a small investment.

G. W. PECK, CDR
CNATWA Wing Safety Officer

● See page 16 for the puzzle. **What's an auto safety message is doing in a professional aviator's journal? Last year more airmen died in their cars than in the cockpits of their aircraft. Nuff said.**

Pressure Suit Ditching

Dallas, Texas—The second annual safety conference on the F8U here at the plant was highly successful and may lead to other companies starting up similar exchanges of information at the working level.

I'm enclosing a couple of pictures of the full pressure suit ditching demonstration which John Omvig, one of our test pilots, put on for the assemblage. It was pretty interesting and it sure planted the bug in many a mind that it might be a good idea to check out pilots in that sort of thing, a la Dilbert Dunker. It took an old experienced hand like John 3½ minutes to get out of his harness, unfurl his life raft and get in. And he had practiced it once before. In rough waters instead of a swimming pool, it would have been a pretty hairy operation.

ART SCHOENI
Public Relations
Ling-Temco-Vought, Inc. ●

Escape from Sinking Aircraft

By

C. C. Woodward and Daniel L. Lorch, ACEL

What problems does a pilot in this situation encounter underwater?

The throttle is slowly advanced and the jet engine roars to a deafening whine. With helmet braced firmly back against his headrest, the pilot awaits the catapult stroke. All instruments and lights—checked. The signal is given. The jet fighter catapults off and dips out of sight below the edge of the carrier deck. Suddenly it is no longer a routine operation; something is wrong. Flames blast from the afterburner as the aircraft wobbles over the waves in a sickening nose high

attitude. On deck, the pilot's shipmates are apprehensive, helpless, hoping for the best.

Since the end of World War II, this type of accident has become increasingly more dangerous from the pilot's viewpoint. Modern jet aircraft enter the water at much higher speeds than reciprocating engines. They possess very little buoyancy and consequently tend to sink quickly. Higher impact speeds impose higher loads on the pilot with an increase and severity of injury and shock making immediate action for escape difficult or impossible.

What Problems

What problems does a pilot in this situation encounter underwater? Can he breathe from his aircraft oxygen system? Can he jettison the canopy? Does the buoyancy of his clothing and parachute pack tend to hinder his escape?

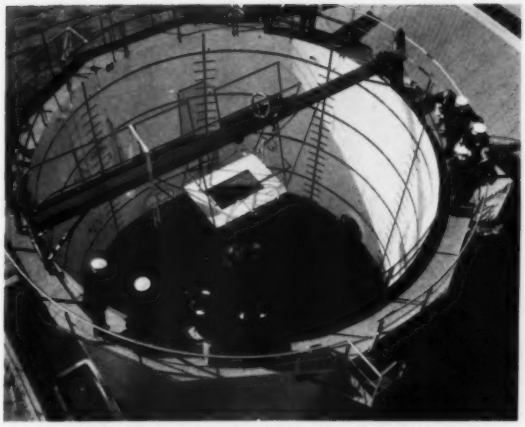
To find answers to these and other questions is the purpose of the Navy's underwater escape research program currently being carried out by the Air Crew Equipment Laboratory at the Naval Air Material Center, Philadelphia.

The first step was to establish the environmental problems facing a pilot after his aircraft crashes into the sea. This part of the program was assigned the Naval Air Development Center, Johnsville, with ACEL specialists as consultants.

A number of unserviceable jet aircraft were instrumented to record sink rate, sink attitude, cockpit differential pressure and impact accelerations. The aircraft were dropped in various attitudes from a height of 50 feet into the Gulf Stream near Key West, an area chosen for its clear water, ideal for underwater photography.

Test results indicated that the first and most serious problem is impact force which can daze, injure or kill the pilot. A second problem is the extremely short time the aircraft will remain afloat. Tests showed that, depending on crash attitude and structural integrity, the aircraft will float from 20 seconds to a maximum of one minute. Added to this are the very real problems of rapid sink rate of 5-10 feet per second, the virtual impossibility of removing the canopy once it is under one foot of water, and the violent implosion of the canopy caused by increased water pressure approximately 15 seconds after sinking. Defining the problems which a pilot can expect to encounter, establishing minimum-time escape procedures, providing training in these procedures, and using the basic research data to improve equipment will help the Navy improve the underwater escape picture.

ACEL was given the task of determining what can be done now and in the future to better the pilot's chance for underwater survival. It was discovered during the tests that once the aircraft canopies were under one foot of water most of them could not be removed. The canopy jettison systems designed for air load conditions were not powerful enough to overcome the force of the water pressure acting against the canopy. In tests with dummies after the aircraft descended to depths between 30 to 50 feet, the differential pressure on the canopies became so great that they imploded with great destructive force, showering sharp fragments of plexiglas into the cockpit and the dummy occupant.



Helicopter rescue demonstration utilizing ACEL helicopter rescue mock-up

After study of the Key West test results, it seemed evident that with present equipment the pilot must either remove the canopy before the aircraft sinks or, if this is impossible, he must eject through the canopy as a last resort.

The immediate problem was to determine the type of procedures a pilot should follow in escaping from a submerged aircraft with the canopy jettisoned. An F8U-1 cockpit section with an operational MBA Mk-F5 ejection seat was modified so that it could be lowered without the canopy into a 30′ x 30′ research tank. Tests were performed with the "aircraft" in the erect, nose down, tail down and inverted attitudes.

In the tests, the volunteers were strapped in the ejection seat and submerged in 20 feet of water. They wore either the standard summer flight suit, helmet and A-13A oxygen mask, or the Mk-4 full pressure suit. Two ACEL civilian engineers and a physicist, trained as Scuba divers at the Navy's Underwater Swimmers School at Key West, were in the tank during each test to take sequence stills and movies of the escape and to assist the test subject in the event of an emergency.

Modification Necessary

The tests indicated that no modification to the pilot's oxygen system was necessary for under-

Scuba diver standing by to assist test subject in the event of an emergency—F8U-1 cockpit assuming nose-down attitude

water breathing. The subjects, with practice, were able to breathe comfortably under water with either the standard A-13A oxygen mask or the full pressure suit. After disconnecting from the aircraft oxygen system, the subjects were able to breathe from the bailout oxygen bottle which is actuated automatically on man-seat separation.

Observers noted that each subject's escape time improved as he became more familiar with equipment and escape procedures. After several practice runs using the proper technique, test subjects were able to trim 15 seconds or more from their escape time. Although this time differential is small, it means escaping 75 to 150 feet closer to the surface of the water.

Two methods of escape considered the most promising were investigated: egress taking both the parachute and survival kit and egress taking only the survival kit. Underwater escapes leaving both the parachute and survival kit behind were ruled out as land egress tests had previously proven that this procedure required additional time. The tests not only established proper egress procedures but also defined problems which may be encountered if these procedures are not followed.

Of the two methods of escape evaluated, egress taking both the parachute and survival kit proved to be faster and is recommended. The following is quoted from the ACEL account of the tests:

Pull Emergency Handle

"This procedure requires that the pilot pull his emergency harness release handle located on the right side of the ejection seat, releasing his parachute and survival kit from the seat, as well as disengaging his leg restraint lines. He must then disconnect the hoses on his left side, anti-G suit vent and survival-kit-to-aircraft-oxygen hose. The pilot must then lean forcibly over the windshield to free the parachute from the seat. Upon clearing all obstacles, he can actuate his flotation equipment and ascend to the surface. By breathing normally and being careful not to hold his breath, he can prevent air embolism. Tests proved that this escape procedure must be followed in every detail or the pilot may fail to separate from the aircraft. Under ideal conditions, a trained pilot can expect to separate from a sinking aircraft in 15 seconds."

More Research

The research task is far from completed. At present, ejection tests are being conducted in the test tank to determine if a pilot can survive the shock wave and high velocities produced by the rocket catapult ejection system fired underwater. Other problems being studied in these tests are seat separation and chute entanglement following ejection, and methods of incorporating energy absorption into seats to reduce water impact forces on the pilot.

Remote control movie cameras and underwater closed circuit television will supply the visual record of the rocket catapult ejection tests. If the instrumentation records show that the blast pressure is low enough, engineers will dive into the tank for the remaining ejection tests to evaluate effects subjectively.

Continued research work will establish the requirements for redesign of equipment to improve pilots' chances of survival. ●

Research engineers trained as scuba divers prepare to enter the ACEL test tank.

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NO SECRET

'I Ejected Underwater'

This, in the pilot's own words, is the story of the Navy's second successful underwater ejection and subsequent rescue. (Ed. Note: The U. S. Navy's first successful underwater ejection occurred in March '57 when the pilot of an F4D successfully ejected from an inverted position while underwater). It shows that the ejection seat has a capability of emergency egress below the water as well as above. However, it should be remembered that as an automatic mechanical device the parachute deployment process will function "as advertised" in the water as well as in the air.

"I WAS the eighth aircraft launched from the starboard catapult. I was launched five to six seconds after another FJ. I noticed that he went straight ahead and did not climb . . . I encountered slipstream as the gear came up and the right wing started down. I went in with full left rudder and aileron. The aircraft continued to roll and turn to right. Although the idea to eject was strong. I ruled it out because of the poor attitude of the aircraft. I felt the wings go almost level and thought I might make it when I received a tremendous sideways g-load which felt like a small nuclear war commencing.

"Things are a little hazy, but to the best of my recollections after the initial realization that I wasn't dead, I also realized that I wasn't flying — rather, in fact, underwater and going down. I don't remember pulling the emergency canopy release handle, but may have done so. I pulled at the face curtain left handed and the seat worked as advertised. I either saw or felt the chute deploy underwater and then I was free of the seat.

"I pulled the bottle on my C-3 vest and released the right rocket fitting on my canopy harness. By this time the mask and helmet was full of water. After trying to release the Hardman fitting one time to no avail, I raised the visor and grabbed the back of the helmet, rolling it forward and down off my head. This done, I took a big gulp of air, congratulated myself on being alive and tried to get rid of my parachute by the left rocket release. I couldn't release it. By this time I'd tried it with my gloves off. My knife and hip holster (both worn on my right side) were torn off sometime in the melee.

"The chopper dropped the horse collar and I was hoisted aboard. Since my chute was still attached the chopper driver had a real rough job on his hands. He did a magnificent job while his crewman tried to cut away the canopy shrouds. Needless to say I had a death grip on the chopper. The chute billowed out and to the dismay of both the crewman and myself, I fell back into the water. The sling was dropped again; I hooked an elbow through it and pointed to a motor whale boat arriving on the scene from the carrier. The chopper dragged me toward it and the rescue was finalized."

As a result of this experience the squadron issued all pilots a knife with a riser cutter (GSA Catalog page 131 under stock number 7340-526-8740) for use in the event of chute or riser entanglement.

INSTRUMENT AUTOROTATION

As the all-weather helicopter comes more into its own there is an increasing emphasis on instrument training including the practice of hooded instrument autorotations.

There is some controversy over the best procedure for conducting the hooded autorotation.

Two recent HSS-1N accidents in the Navy occurred as a result of poor pilot technique and inadequate procedures. In these two Navy cases as well as the following Coast Guard example, insufficient airspeed during the maneuver led into a condition of power settling. Once a good case of power settling is underway it can take several hundred feet of altitude to recover from it. If it is not recognized, as in this case, it can take more than a few hundred feet. Those who advocate 30-knot hooded instrument autorotation practice with a recovery at 200 feet should seriously consider this.

The pilot was making a hooded instrument auto-

rotation and intended to recover 550′ above the ground. The plane settled into the ground, rolled over and burned, receiving strike damage. Of the four occupants, one received serious burns, two received minor injuries, and one was uninjured. Cause factors were found to be pilot, possible psychological and supervisory.

History Of The Flight

The aircraft commander flew the first hour under the hood in the right seat. He then changed seats with the copilot who started hooded IFR procedures. About 20 minutes afterwards, the copilot asked a make a hooded autorotation. The aircraft commander, acting as safety pilot, specified a recovery altitude of 800′ MSL (550′ above the ground).

The copilot made a normal autorotation with an airspeed of 50-55 knots. At 900′ MSL he started recovery by entering a flare. The rate of descent stopped at 800′ and the pilot married the needles at about 20 knots airspeed after bringing the plane to a level altitude. He held this altitude with 30″ Hg. and 2400 rpm. Soon the safety pilot said they were settling. Power was increased to 38″ and 2400 rpm. Shortly thereafter the safety pilot took hold of the controls but did not advise the pilot whether or not he was taking control from him. The pilot felt the safety pilot on the controls and relaxed his own movements while keeping his hands and feet on the controls. The safety pilot stated that they were still settling.

The safety pilot had glanced outside to check for other aircraft just before he made the second statement that they were settling. After the second statement about settling he took firm and positive hold of the controls but did not at any time tell the pilot that he had control or that the pilot should remove the hood. The safety pilot, apparently by reference to the terrain, became concerned about the settling. He attempted to push the cyclic forward but said that it felt 'sluggish' and would not respond. He did not drop the collective and soon felt that if he dropped it they would 'plummet' into the trees. He started adding collective and throttle at this point and continued adding them until ground contact.

At some point in the latter stages of the maneuver the pilot felt a slight shudder and glanced out by raising his head without removing the hood. He was under the impression that they were still 300-400′ above the ground at the time he looked up and saw trees. His first impression was that they were in a vertical dive. He attempted to depress the collective and pull back on the cyclic.

The helicopter settled into the tree tops with little or no airspeed and apparently with a low rate of descent. It came to rest on top of a tree stump, rested there momentarily in a fairly level attitude, and then rolled to the left, caught fire and burned. The occupants were able to get out of the plane with no difficulty although one of the crew in the passenger compartment was seriously burned by the fire which started immediately after the helicopter rolled over.

The Investigation

Investigation determined that the helicopter probably encountered power settling shortly after the pilot commenced the flare at the end of the autorotation. The Board felt that the method of recovery used by the pilot was unsafe and would induce power settling. Four days after the accident the Board questioned each pilot at the station individually and, without exception, they all stated that they did not perform a recovery by flaring to a hover. Instead, they all felt that the only safe recovery was to fly the helicopter out of the autorotation by maintaining airspeed and adding power. It was not determined how the two pilots involved had arrived at the use of a flare type recovery since both of them had just completed the helicopter instrument syllabus at this unit. It was felt that the accident and subsequent discussion among the other pilots prior to their questioning had probably served to crystallize their thinking about not allowing a flare under the hood.

The Medical Officer's report, which was outstanding in its thoroughness, stated that preoccupation may have caused the safety pilot's delay in recognizing the increasing danger of the maneuver.

Factors In This Accident

Pilot Factor—in that the safety pilot failed to recognize and take appropriate and timely action to recover from a power settling condition.

Possible Psychological Factor—in that preoccupation may have delayed the safety pilot's response to the situation.

Supervisory Factor—in that the recovery techniques at the unit were not standardized among the instructors and no attempt had been made to advise the Commandant of the potential danger in the flare type of recovery from a hooded autorotation.

Corrective Action

The safety pilot's helicopter qualification was suspended pending instruction in power settling and recovery from hooded autorotations.

Commandant (OAV) message 062222A, April, 1960, required that all recoveries from hooded autorotations be made at a minimum airspeed of 40 knots with at least 500 feet of terrain clearance. ●

—U.S. Coast Guard Bulletin 8

One year with the UO

By
Bill Kershner
Piper Aircraft Corp.

The UO-1 *Aztec* has been in the Navy for over a year and for most of the pilots flying it, the airplane has been a "change of pace."

Since the average Naval Aviator's background does not necessarily include a great deal of light-twin experience, several suggested procedures may be useful for future operations.

When the engines are hot a minor revision to the normal procedure can be made (mixture rich, ignition on and boost pumps if you feel they are necessary). Don't pump the throttle until the engine is cranking over. While it is turning, pump the throttle once (briskly and at least half way), then pull it back to the cracked position. If the engine doesn't take, then pump the throttle once again while continuing to crank the engine. The procedure does not take nearly as long as it takes to read it. In fact, 3 to 5 seconds of turning per engine is usually the maximum required for this method.

If the temperature is down toward freezing, use of the primers is definitely recommended and you can expect to use ten shots or more per engine. A copilot can help by priming as you turn the engine over. Be sure and lock the primers after the engine is running; an unlocked primer can be the cause of a rough running engine, and has fooled more than one maintenance type.

Inadvertent Door Opening

A problem sometimes encountered during the first year was that of the cabin door opening on takeoff or in flight (usually traced to failure to properly latch the door or inadvertent opening by right seat occupant). A kit consisting of a safety latch used by civil *Aztec* owners has since been purchased by the Navy for the UO-1s in service.

If the door should come open it will open only a few inches; however, there will be a sudden air suction in the cockpit and a large and disconcerting increase in the noise level. An open door also causes a vibration (buffet effect) in the tail which disappears if the right seat occupant will pull the door as nearly closed as possible.

Generally, it is difficult to close the door while in flight and if it is convenient to land this is the answer. However, repeated demonstrations have shown that the door can be closed in flight with this procedure: (a) Throttles to idle, (b) Slow to approximately 65 knots (generous use of trim), (c) Use your left elbow to hold open the small storm window on the pilot's side and as the airplane slows to 65 knots, push out on the door with the right hand then bring it shut with a slam.

About this time forget the storm window and ready the left hand to lock the door as soon as it slams shut. All this gymnastic activity is based on the idea that you have to do all the work. As the UO-1 is still friendly at this slow speed, the fact of a few seconds *hands off* flying will be no problem.

Short Field Operation

At some time the UO-1 pilot might be called upon to use a short, short airstrip. Naturally, such a landing will call for full flaps unless wind conditions are such that lesser flap settings would be advisable (if the wind is strong enough for that the landing roll will be shortened anyway).

On the approach slow to 65 knots and use power to control the angle and rate of descent (*note this is 5 knots below minimum single engine control speed*).

For a short field takeoff, the pilot has two choices.

If the takeoff area is short but there are no obstructions to be cleared (an unusual situation) use one-half flaps. This will give minimum takeoff roll *but not the best obstacle-clearing climb.* Rotate the airplane as soon as an airspeed of 45 knots is obtained (this is for maximum gross

weight) and when definitely airborne get the gear up and clean up the flaps as speed increases.

For the best combination of short takeoff and best angle of climb, use one-quarter flaps. Make a *deck run* type takeoff (this terminology is for the older CV pilots). Set up a climb at 70 knots and as soon as definitely airborne get the gear up. Leave flaps alone until well past the obstacle and until the speed builds up.

In a situation needing maximum range, set up an *indicated* airspeed of 105 knots (at max gross) for any altitude. The no-wind *maximum* range of the recip airplane is the same from sea level up—you simply get there faster at higher altitudes. Set up 2000-2100 rpm and manifold pressure to maintain altitude (approximately 16-17 inches at gross).

Indicated airspeed will increase slightly but for simplicity can be considered as fixed. The power required is about 37 percent and total fuel consumption will be about 14 gallons per hour. No-wind max range will be 1009 nautical miles including fuel for taxi, warm-up, takeoff and climb to 7000 feet, plus 5 percent of initial fuel and 20 minutes at maximum *endurance* at sea level.

When you are holding and ATC keeps pushing the expected clearance time further into the distant future you want to squeeze all the time possible out of the airplane. The power-required curve for the UO-1 at max gross weight shows this max endurance point is at 88 knots.

Slow the airplane to 88 knots (call it 90) and use whatever manifold pressure is necessary at 2000-2100 rpm to maintain altitude. It will generally be around 14-15 inches at 4800 pounds. Total fuel consumption under these conditions will be approximately 12 gallons per hour. Since 90 knots is fairly slow for good control in turbulent air you may desire to use 105 knots and take a couple of gallons an hour penalty. If you ever have a choice remember maximum endurance for recips is found at sea level.

Turbulent Air

An airplane's reaction to vertical gusts is a function of its wing loading and wing lift curve slope (amount of lift change with change in angle of attack) and other design variables. Because of this, light airplanes may be considered to *bounce* in turbulent air by pilots used to heavier craft.

As the UO-1 is an off-the-shelf airplane, its airspeed indicator is marked for certain speed ranges in accordance with civilian practice. Next time in the airplane note the color markings.

- White arc—Flap operating range. Upper end of the white arc marks maximum speed for flap extension. Lower arc is power off, gear down, full flap, stall speed at gross weight.
- Green arc—Normal operating range. Lower end is power off, clean stall speed. At the upper end, where the green arc meets the yellow, is the maximum structural cruising speed (172 knots or 198 mph). Keep in the green when flying bumpy air.
- Yellow arc—Caution range. Smooth air only.
- Red Line—Never exceed speed. This speaks for itself.

A good turbulence penetration speed at max gross weight is between 125 and 145 knots (145 to 165 mph). As the weight decreases, this speed range narrows and moves back. At 4000 pounds it is 115 to 130 knots (132 to 150 mph).

This is based on the gusts found close to thunderstorms (43 foot per second velocity). The engineers base their figures on vertical velocities of 15, 30 and 43 fps. How the pilot can tell without involved calculations at what velocity the vertical gusts are moving, nobody has bothered to explain. You can imagine getting into turbulence and exclaiming, "Good grief, that was a 26.775 fps vertical gust we just hit!"

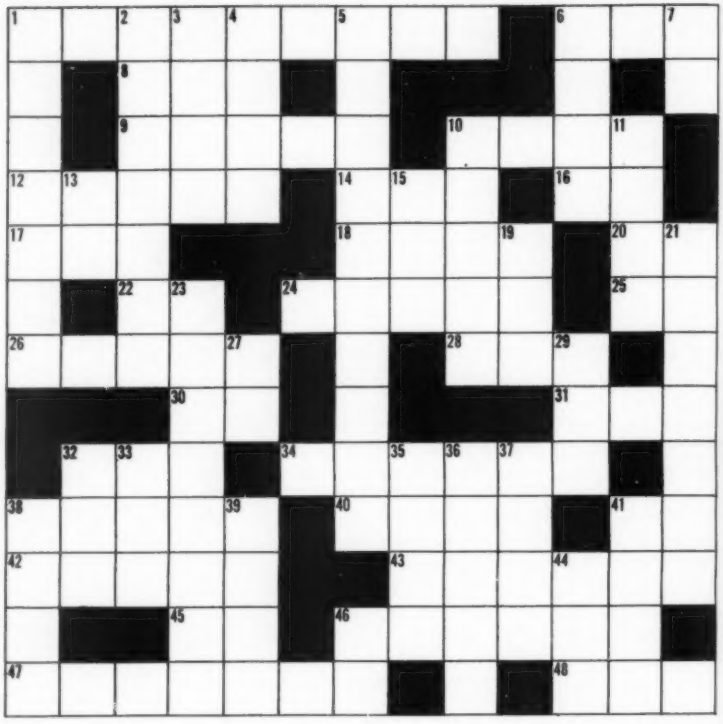
One conception, or misconception, commonly held is that the UO-1 "can't take the turbulence." This was arrived at by the following deductions: It is small and it *looks* light. As the airplane is relatively short coupled it may seem to *bounce* more than heavier planes but as far as being less safe this is not so. With an allowable limit load factor of 3.80, plowing into a 30 fps upward vertical current at maximum structural speed (top of the green arc) would give a G-loading of 3.10 and a safety margin of 0.70 G (*due to an increase in control difficulties, moderate or heavy turbulence should be avoided—this is a general rule for the UO-1 as well as other similar aircraft—Ed.*).

Landings

If there has been one major error in landing the UO-1 it has been that of *driving it on.* In these *wheelbarrow* landings the airplane is shoved on the runway at a greatly excessive speed and the wheel held forward so hard that the plane rolls down the runway practically on the nosewheel. It lands best on the back side of the main wheels.

Basically, the actual landing techniques are the same as for any other tricycle gear type. Make the final about 75 knots (80 knots is plenty good for base) with full flaps unless wind conditions warrant otherwise. You'll find that pulling the throttles back to the idle when you have crossed the end of the runway will leave plenty of speed and control for landing. Holding off is the secret, just like you did in the Stearman, T-34, or whatever other light airplane you did your first flying in. Nuff said. ●

SAFETY CROSS-WORD PUZZLE



ACROSS

1—Safest method of driving
6—Akin to the road-hog.
8—That which all young drivers attempt to do.
9—Unfortunately, the way autos frequently leave the turnpike.
10—Often the permanent souvenir of a careless mistake.
12—That which fog does to a hazardous road condition.
14—A suffix—used in chemical terms.
16—Usually precedes "parking."
17—Resembling the head of a "jay walker."
18—Term used to describe repeated traffic offenders.
20—Sometimes, when answered, results in purchase of an unsafe automobile.
22—The accident prevention team.
24—An act which prevents many a traffic mishap.
25—Careless acts result in an increased work load for this gent. (Abbr.)
26—The highway's Public Enemy No. 1.
28—A sound often heard at an accident scene.
30—Automobile owner. (Abbr.)
31—Final home of many speeders.
32—Insurance adjustment. (Abbr.)
34—Many lives are shortened without it.
38—"When in —, don't."
40—"Slow down and —."
41—The person most responsible for your safety.
42—Often the innocent victim of a driver's careless act.
43—No driver is safe without it.
45—A suffix.
46—Found in dark corners and on highways.
47—Probably the most hazardous driving season.
48—The only alcoholic beverage to drink when driving.

DOWN

1—Without them, no traffic accident is possible.
2—A killer of foolish motorists.
3—Chemicals used in antiseptics.
4—Unfortunately, the safe driver is not, the accident causer is.
5—These efforts when combined, join to form the ultimate in safety programs (100% accident free).
6—A necessity for any long trip.
7—Like many others, this procedure is done with caution.
10—A good safety attitude ——— others.
11—Built to be shared with others.
13—For example.
15—A premature result for immature drivers.
19—Former name of Tokyo.
21—This type person is the scourge of the highways.
23—Life insurance.
27—"——— unto others."
29—You cannot do this with safe driving experience.
32—A Hawaiian dish.
33—Another driving hazard.
35—A product of careless activity.
36—The body to which all safety precautions apply.
37—A combination of individuals promoting safe practices.
38—Confine this practice to paper —not intersections.
39—Involved in many loss-of-control accidents.
41—A dangerous element when combined with "Xide."
44—Accidents are also a surety for the careless driver.
46—In contest with (Abbr.).

For the correct solution to this puzzle please turn to page 43.

Are YOU the weak link?

by CDR C. A. Merryman

Who is holding your life in his hands? Remember the story of the little Dutch boy whose timely action in plugging the hole in the dike with his finger saved a countryside from disaster? Small in physical stature, young in years, yet this lad literally held the lives of thousands in his hands.

Today, in naval aviation we have many young lads, young in the sense that they are new to the Navy, inexperienced in the field of aviation as well as being young in years. These men hold your lives in their hands. The following true story based on factual reports graphically illustrates this statement.

Not long ago, two pilots reported to the Flight Officer aboard a large naval air station. LT Smith was up for an instrument flight check—LT Jones was the check pilot. Both were experienced pilots with several thousand hours each and qualified in the model aircraft they were to fly, a JRB. Following a check of the previous squawk sheets in maintenance, the pilots were briefed on the weather and filed a DD175. The operations duty officer requested they take along two mechanics who needed flight time. After a thorough exterior check, the pilots boarded the aircraft and started engines. While taxiing, Jones, the check pilot, acknowledged to the tower their instrument clearance giving them an assigned altitude of 6000 feet. Takeoff and climb to altitude was uneventful.

So far, so good. All checklists had been used, all proper procedures followed, simply a routine instrument check. After approximately 30 minutes of flight, Smith, in the left seat, began to feel a little dizzy. He could almost taste the martinis he'd had the night before. Jones, who had been to the same happy hour also felt a little under the weather. Both pilots opened their side windows and air vents and immediately felt better as the cool air bathed their faces.

Routine instrument work was progressing normally when a rain squall with moderate turbulence was encountered. Safety belts were tightened and windows secured. Jones turned to check on the passengers. For the first time he suspected trouble, bad trouble. Both passengers were unconscious. The plane went into a steep dive. Smith had passed out and slumped forward against the wheel. After a few seconds of fast action Jones leveled the aircraft and locked Smith's shoulder harness to keep him upright in the seat. He opened both air vents and windows and asked for an emergency descent clearance. Ten minutes later, he landed at an outlying field having notified the base tower of his intentions and requesting emergency medical assistance. Jones managed to remove the three unconscious men from the aircraft before losing consciousness himself. Shortly thereafter medical assistance arrived. Smith and Jones recovered consciousness after emergency first aid. The passengers were taken to the hospital and recovered approximately 12 hours later.

By a margin as thin as our little Dutch boy's finger, a fatal crash was averted. A crash which would have undoubtedly taken four lives. What caused this near disaster? Was it hypoxia, carbon monoxide fumes seeping into the cockpit? No, nothing so complicated. A boot, new on the base, had been assigned the duty of cleaning the interior of the aircraft. Being eager to do a good job, he was using a can of carbon tetrachloride to remove some stains from the pilot's seat. Desiring a cigarette, he had carefully placed the *open* can under the pilot's seat and departed the aircraft for a smoke. You know the rest. Sometime during takeoff or shortly thereafter, the can overturned with near disastrous results.

Here we have a perfect example of the crux of our safety and accident prevention program in the Navy. Safety is an ALL HANDS responsibility. From the newest boot performing the menial housekeeping task to the four-star admiral formulating policy, so the chain of safety is forged. Your life depends on the strength of this chain. It is only as strong as its weakest link. Be ever alert to make use of all opportunities to strengthen this chain through training, proper supervision, inspection and unceasing efforts to prevent accidents. Stand ever ready to detect a weak link and, as our little Dutch friend, plug the hole that threatens our dike of safety. ●

anymouse

WHAMBO!

PICTURE the setting. It's dark. It's turbulent, and you are slogging around in an A3D through rain, sleet and snow. Altitude is 2300 feet and GCA has turned you on crosswind leg of an actual GCA to NAS Whidbey. Then, Whambo! There is a loud crash and flash of light.

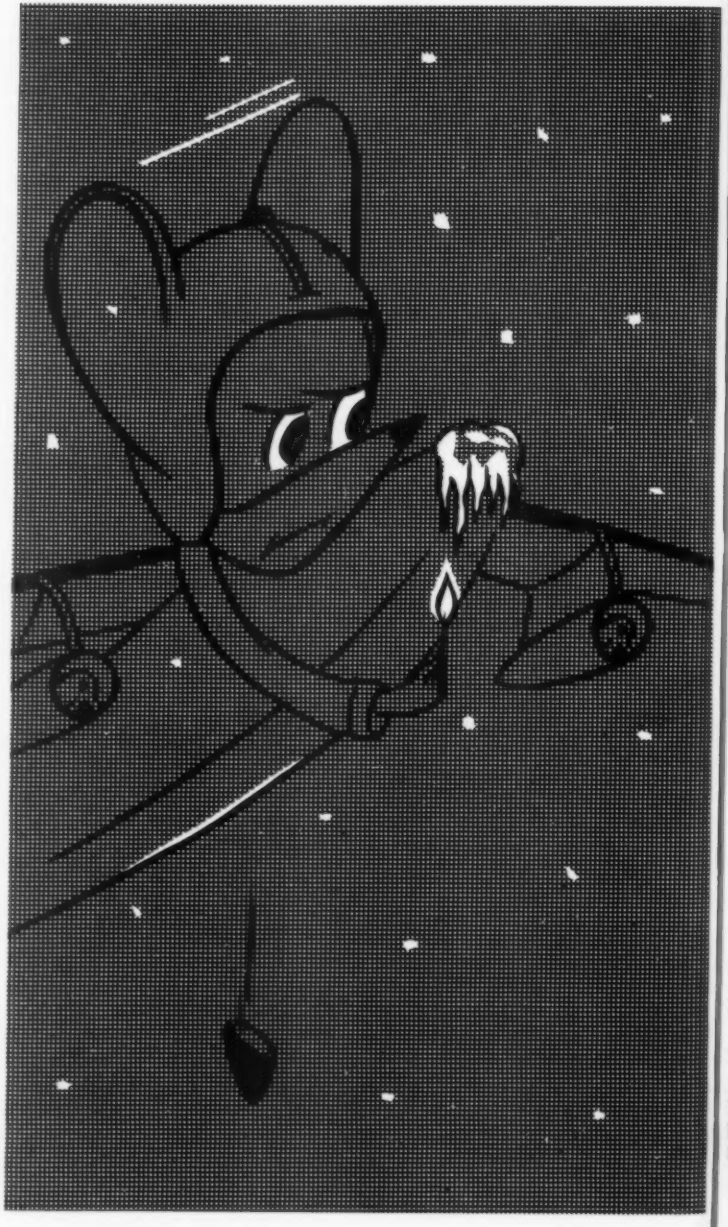
The pilot who experienced this was temporarily blinded and assumed the aircraft had been struck by lightning. He noted a loss of airspeed readings, rate of climb, angle of attack and erroneous altimeter readings. The cockpit noise level had greatly increased though the aircraft seemed airworthy.

The best decision seemed to be to clean up wheels and flaps and climb for altitude by use of gyro horizon only—cloud tops had been between 10 and 15-thousand in earlier portions of the flight.

The aircraft was finally VFR on top and Seattle radar was requested to vector another A3D into position for a section penetration. Now it was seen that the entire radome had been blown off. This accounted for the noise level but more serious was the fact that the throttles were literally frozen at full power. The throttle rigging extends forward into the now exposed radome area where freezing precipitation had taken hold.

A playmate now joined but with no throttle control the pilot of the disabled A3D maintained wing position through judicious use of dive brakes. Power was later reduced by sheer muscle power on the throttles and the situation cleared completely below 3000 feet.

An LSO was standing by to monitor the approach and the arresting gear was ready; however, it turned out to be an uneventful ending. *Good show*, HEADMOUSE.



DANGLE ANGLE

WHILE on a VFR flight up the California coast we were cruising at 500 feet. Upon landing we discovered that approximately 60 feet of hoist cable had been streaming along below us.

The hoist switch for the pilot or copilot is on the cyclic stick and neither of us remember keying the switch but it undoubtedly happened (there is a selector switch giving hoist control to pilot or crewman and our switch was selected to the pilot position).

Due to the cold weather the sonar compartment hatch was closed so the crewman didn't see the hoist go down. It could have easily tangled in the tail rotor, the sea wall, or runway lights.

REPEATED SQUAWKS!

WHILE waiting for transient maintenance at an air station I heard the following conversation over the squawk box:

Maintenance PO calling station eight: "Have you worked on that last hydraulic gripe I gave you?"

Station eight: "Filling it now."

Maint. PO: "Well, hold up on it. The pilot just called and said to fill it in the morning as it will all leak out before takeoff if you fill it now."

Station eight: "Roger."

PERSEVERANCE PAYS?

WHAT happened? Weather info was not available for my destination (a master jet base) at takeoff point (another master jet field).

Why? Not on weather distribution circuit.

What did you do? Used weather from nearest reporting point and called Metro twice enroute.

Results: Got there and landed.

Recommendations: Include weather for master jet fields within say 1500 miles of each master jet field (round figures for our Fleet types).

● *This must be the guy what took my 1962 Farmer's Almanac.* —Headmouse.

FMLP TRAFFIC

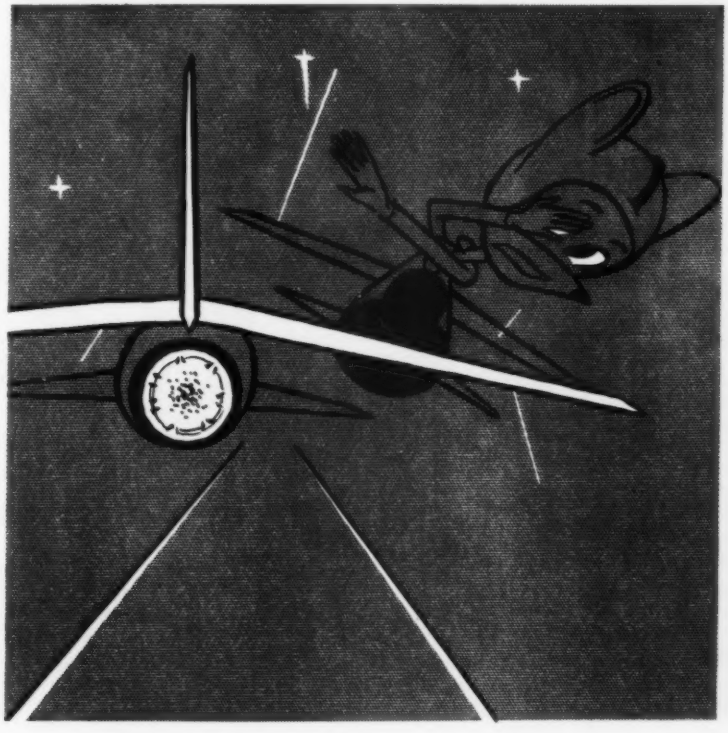
DUE to fueling difficulties at home base, our F8Us were going to be late for the night FMLP "Charlie" time at an outlying field. As soon as each plane was ready, a pilot was in and on his way. I was the first one to launch with another F8U just a few minutes behind me.

After getting airborne I switched to the LSO frequency and was cleared to break for runway 5. As I turned into the initial for the break, I heard the other F8U call the LSO. He was also cleared to break for 5 and though he rogered he did not acknowledge the number. Just as I was about to break an F8U went flashing by my port side in the opposite direction, so close that I could almost see my wingtip light reflected in his eyes.

On this black night he had come into the break for the wrong runway and it was the closest thing to a head-on midair collision that I have ever seen. Needless to say my passes on the mirror weren't as smooth as they should have been.

The LSO was sure he said runway 5; the other pilot was sure he heard runway 23. I'll have to agree with the LSO. The wind was very light and 90 degrees to the bounce runway so either runway could have been used.

In these situations we might well repeat (acknowledge) the duty runway in the same manner we acknowledge radar headings and altitudes. ●



HYDROGRAPHIC HOLDING ENTRY TEMPLATES

by William R. Campbell

U. S. Navy Hydrographic Office

Everybody is getting into the business of holding pattern entry templates, including APPROACH (see Enter Rightly Hold Tightly, March Edition 1962 APPROACH).

The Hydrographic Office, a new entry in the template business, has made available a prefabricated do-it-yourself template for E6B type computers. The template (Figure 1.) was distributed in quantity by Memorandum For Aviators No. 5 of 21 February 1962. Complete instructions were included for assembly and how to use it. Figure 2 depicts the assembled template. Notice that the holding patterns and entry sectors are oriented so that the computer true index is used for solution setting.

For those who didn't get the word from the Memorandum, instructions for using the template are repeated as follows:

1. Set inbound holding course on compass circle under True Index marker.

2. Locate on compass circle the aircraft inbound course to the holding fix.

3. Read template data found opposite this position for appropriate holding pattern entry sector and instructions.

Example —

Standard Holding Pattern

Problem: Aircraft is approaching fix on 080° course with ATC clearance to hold in a standard pat-

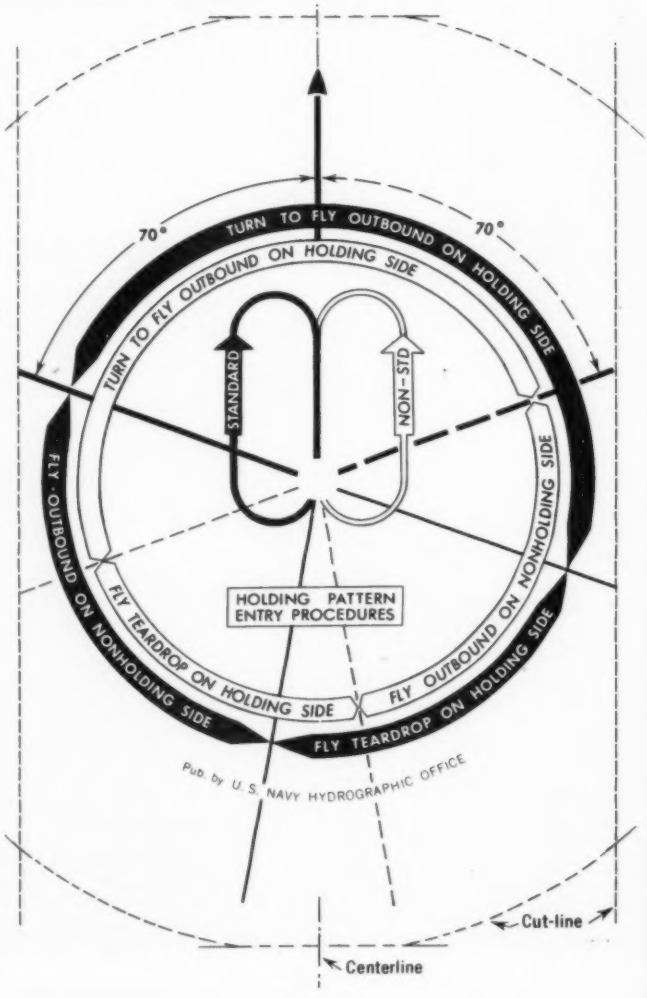


Fig. 1

Fig. 2

tern on inbound course to fix of 240°.

Solution: Rotate compass circle (inner dial) until 240 falls under True Index. Read opposite 080 on compass circle to find holding pattern entry instructions on outer (black) circular arc; i.e., "Fly outbound on nonholding side." (Sec Figure 2)

Example —
Nonstandard Holding Pattern

Problem: Aircraft is approaching fix on 120° course with ATC clearance to hold in a nonstandard pattern on inbound course to fix of 270°.

Solution: Rotate compass circle (inner dial) until 270 falls under True Index. Read opposite 120 on compass circle to find holding pattern entry instructions on inner (white) circular arc; i.e., "Fly teardrop pattern on holding side."

Additional copies of the template and instructions may be obtained by requisition from U. S. Navy Hydrographic Distribution Offices at Naval Supply Depot, Philadelphia, Pa., or Clearfield Annex, Ogden, Utah, as appropriate.

This should take care of those who use an E6B type computer. But what about the boys that don't use this type of contraption? Well, the Hydrographic Office has also developed a template with no moving parts that takes care of everybody. If you don't mind a small subtraction problem, you'll probably want to try the template shown in Figure 3. You'll notice that a fixed compass circle is included. Rotation of the compass circle is, in effect, accomplished by subtracting the inbound holding course from the inbound aircraft course. Read the answer on the compass circle and follow the adjacent holding pattern entry instructions. Of course, where the holding course is larger than the aircraft course, before subtracting remember to add 360° to the aircraft course. Solution by this method of the first previous example is as follows:

TURN TO FLY OUTBOUND ON HOLDING SIDE
Inbd acft course
MINUS Inbd hold course
EQUALS Degrees clockwise to Entry Sector
TRANSFER
NON-STD
HOLDING PATTERN ENTRY PROCEDURES
Pub. by U.S. NAVY HYDROGRAPHIC OFFICE
FLY TEARDROP ON HOLDING SIDE
FLY OUTBOUND ON NONHOLDING SIDE

Fig. 3

Example —
Standard Holding Pattern

Problem: Aircraft is approaching fix on 080° course with ATC clearance to hold in a standard pattern on inbound course to fix of 240°.

Solution 1:

$$(080° + 360°) - 240° = 200°$$

Read opposite 200 on the compass circle, the instructions for standard pattern entry, the outer (black) circular arc; i.e., "Fly outbound on nonholding side."

For those who would prefer not to have to add 360° in this case, an alternative method of solution is as follows:

Inbound Holding Course minus Inbound Aircraft Course equals degrees *counter-clockwise* on compass circle.

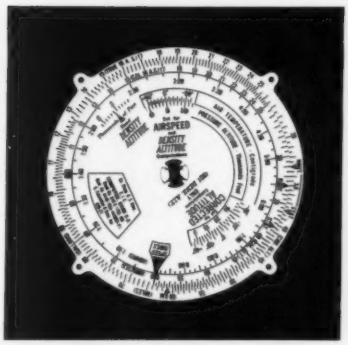
Solution 2:

$$240° - 080° = 160°$$

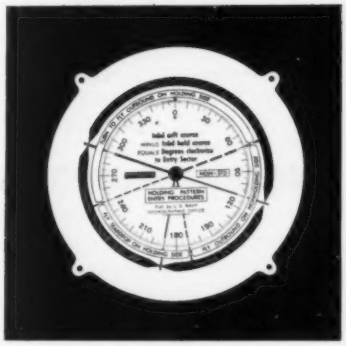
Counting 160° counter-clockwise from 0° (or subtracting from 360°) gives 200° with the same result as before; i.e., "Fly outbound on nonholding side."

The only problem remaining, is where to put the template with the fixed compass circle? Because of its self-sufficient design, there are many possibilities which include printing on any of the FLIP products, or on the back of the Mark 8-A Computer as shown in Figure 4.

How about letting APPROACH know what your preference is? We'll pass the word along to the Hydrographic Office and they will settle this template business to *your* best advantage. ●



face



reverse

Fig. 4

HELICOPTER

Selected Items From Aviation Safety Council Meetings

Aircraft Accident Reporting

There has been a tendency to leave out certain background information on the AAR reports. Units must endeavor to cover this so that higher echelons can get a clear picture of events surrounding the accident, especially where the absence of this info could indicate supervisory error.—*3rd MAW*

Density Altitude Only

The Ream Field Tower will give only density altitude and not pressure altitude in the future. It has been the policy in the past to give both, but pressure altitude is of little use to the helicopter pilots.—*HU-1*

Want Professional Tigers

The specific aim of the sub-committee will be to find ways and means to instill a professional and safety minded attitude in all ComFAirJax pilots. We would like to eliminate the tiger and substitute the professional tiger. A pilot who can perform any mission required of a naval pilot in a safe and efficient manner vice the pilot who is willing to try to perform the mission even though it be beyond his capabilities.—*Southern Area*

Helo Chocks

The question was raised as to the safety aspects of helicopters lifting from the chocks on deck and it was pointed out that in some instances it might be necessary for the helicopter to set back down on deck before clear of the chocks. Even though in most instances the Air Department preferred the chocks to remain to preclude movement of the aircraft if brakes or a tail wheel lock failed, under certain takeoff conditions the chocks were removed. Also on test flights and hover checks they were removed. The squadron representatives stated that they were satisfied with the procedures used and had experienced no difficulties in this respect. It was recommended that the current procedure be continued with the Air Officer in Primary Fly Control exercising caution and being alert to conditions under which chocks might constitute a hazard.—*USS VALLEY FORGE Safety Council Meeting*

METRO

A Recurring Pattern or an Infinite Variety

Climatology is as much a part of aviation weather as the latest sequence report but it generally takes the role of silent partner when a meteorologist talks trip weather with a pilot.

To a pilot with a waiting airplane and his clearance to be signed, climatology is an awkward child, to be ignored as much as possible while more important things are taken care of. Naturally this pre-launch time is not the moment to inquire very deeply into climatology. It is more a matter of prior study such as might be given the Flight Manual of a strange airplane. But even when there is time for a little reading the subject of climatology is not taken very seriously.

Of half a dozen reasons which could be given for this neglect, the most used by pilots is that climatology lacks immediate usefulness in the cockpit —"in summer it's thunderstorms, in winter ice and snow; what more do you need to know?" Climatology actually can do better than this but the interested pilot may be halted by lack of available information of specific bases and areas.

Since climatology is history its interest and application to aviation will depend on who puts the history on paper. A history book which depends on a welter of names, dates, and places will be as boring as a climatology report which details maximum and minimum temperature, date of first killing frost, average amount of rainfall, etc.

The following is a sample of aviation climatology aimed at pilots (It is lifted from the "The MATS Flyer" and was chosen because it was handy).

"Donaldson Air Force Base is located near Greenville, S.C., on the eastern slope of the southern Appalachian Mountains. The topography of the area plays an important role as it affects the local weather. The main Appalachian chain is orientated northeast-southwest and the ridge averages 5500 feet in height approximately 50 miles to the north of the station. The ridge generally declines to the southwest and the main portion of the Appalachians virtually disappears just southwest of Atlanta, Georgia.

"During the winter, as cold fronts from the northwest or north pass through this section, a low level easterly wind flow rapidly moves stratus from the Atlantic Ocean into the Donaldson area. Normally, when this condition exists, ceilings will hold 400 to 600 feet and visibilities 3 to 5 miles in haze.

"Radiation fog formed after a slow moving front passes through this section from the west normally clears rapidly as the cold air behind the front drains down the mountains. However, fog, as the result of radiational cooling during the night, will cover the area with a dense blanket and the field can be expected to be below minimums during the night and early morning hours.

"After the passage of a fast moving cold front from the west or northwest, the mountains cause a funneling effect on the winds. Consequently surface winds 15-20 knots above normal from the west or northwest will persist from 3 to 4 hours after frontal passage.

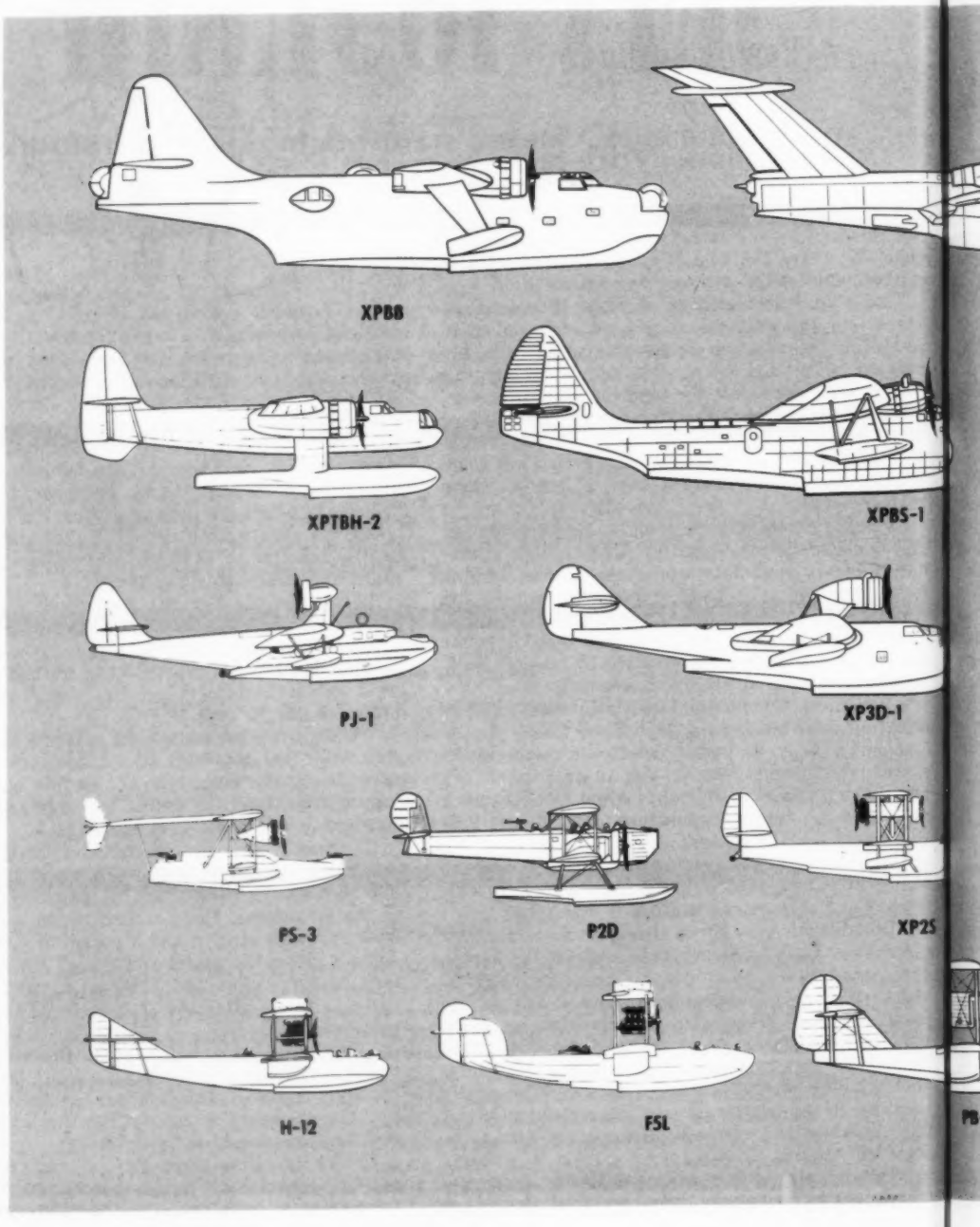
"When a low pressure area approaches this station from the southwest stratus is quickly formed from the moist Gulf air. When this occurs ceilings will generally be 200 to 500 feet and visibilities one to 3 miles in rain and fog.

"Normally, fog and stratus during the winter months are not dissipated until a strong westerly flow blows them away. Due to the close proximity to the mountains, these strong winds will tend to blow over this station and a pocket of cold air will remain along the eastern slopes of the Appalachians, causing fog and stratus to persist from 24 to 48 hours after the stations to the south and east have cleared.

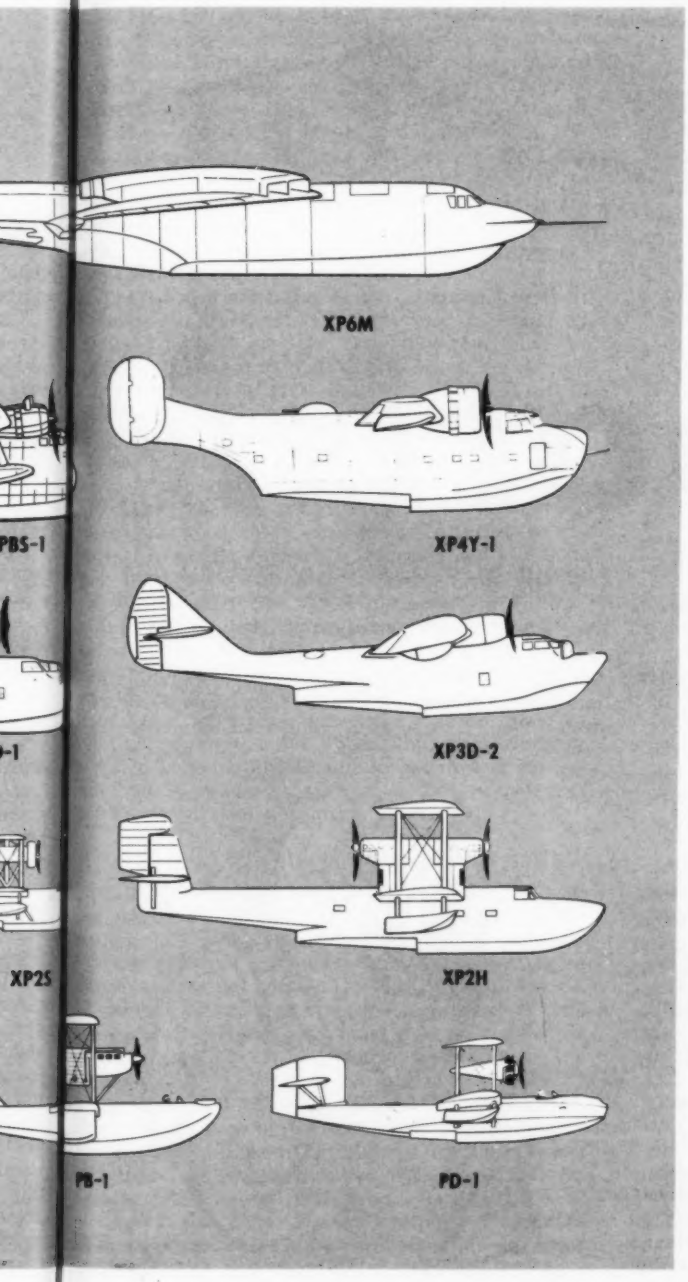
"When stratus and fog cover the eastern seaboard a suitable alternate can usually be found to the west of the Appalachians since the mountains provide an effective barrier to the advection of stratus from the Atlantic Ocean."

Obviously, climatology gives you no magic carpet to "instant VFR" at your destination. It does provide some background for decision making. ●

DEVELOPMENT OF U.S. N



S. NVY SEAPLANES - PART II



1959

1941

1936

1932

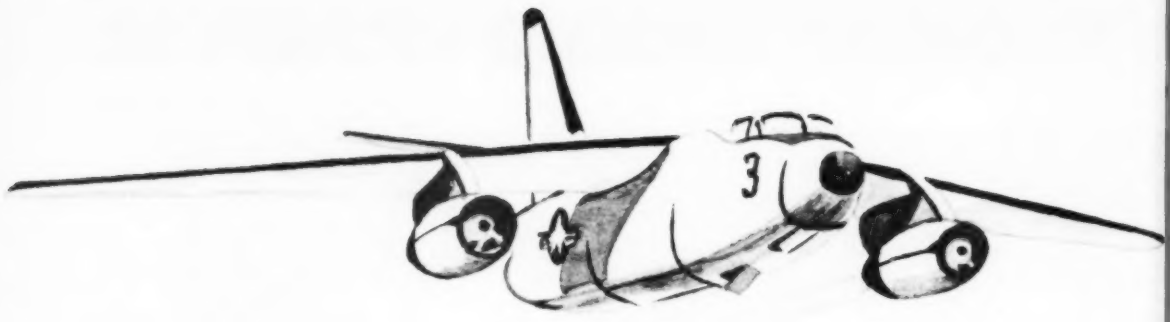
1929

APPROACH (Aug '61) carried part one of the seaplanes. In that issue most of the aircraft shown had been in fleet service. The bulk of the ones presented here were experimental or in limited service. The PJ-1 was a "Coast Guard only" design and of the remaining 15, only four saw squadron duty; the H-12, F5L, PD-1, and P2D.

From the end of WWI to the middle 20's the F5L was a mainstay of the patrol squadrons. The early 30's brought many new seaplanes into active service, accompanied as usual by experimental models, which did not make the grade. Intended as a heavy, long-range patrol plane, the four-engine XP2H was outmoded by the aircooled power plant. Douglas built 25 PD-1s but their XP3D-1 and XP3D-2 did not get into production.

Another flurry of seaplane building took place around 1940; however, the opening phases of WW II eliminated some experimental programs. The big XPBS-1 was changed to a transport and a handful were completed to carry wartime cargo under civil control. Both the XP4Y-1 and XPBB were dropped in favor of landplane production. The recent jet-powered P6M was a promising design but early troubles and national economy dictated cancellation.

Water-based patrol planes have traditionally been of flying boat design and an interesting departure from this philosophy resulted in the float-plane P2D. Primarily called upon for bombing and torpedo work, it was to be replaced by the Hall Aluminum Co. patrol torpedo bomber, also a float plane. The dual-mission concept disappeared with torpedo work assigned exclusively to carrier planes and only the experimental version of the PTBH-2 was built. ●



Dysbarism

This account of severe decompression illness suffered by a crewman of an A3D after explosive decompression at 32,000 feet is one of the most complete reports of an actual case of dysbarism ever received by the Naval Aviation Safety Center.

For a week the LT had been at the air station while he waited for an A3D to come out of overhaul. The time passed pretty routinely. He made good use of the lull by going through the aviation physiology refresher course at the low pressure chamber. The course included a pressure run to 30,000 feet and, although the LT had a history of dysbarism, he had no trouble.

The evening before the scheduled ferry flight, he had a few drinks, ate dinner and got a good night's sleep. The next morning after breakfast he reported as the A3D's photo navigator.

Takeoff was at 1038. The flight was planned for 35,000 feet altitude. In spite of his previous experiences with dysbarism, he did not preoxygenate. After takeoff on 100% oxygen, he removed his mask as was his custom. Some 10 minutes later as the aircraft was climbing through 32,000 feet with a cabin altitude of 8000 feet, the pressure blowdown door in the escape hatch blew open producing an explosive decompression from approximately 560 mm. Hg. pressure to 200 mm. Hg. pressure. Cabin pressure disappeared with a roar as if sucked out by a giant vacuum cleaner. The LT immediately grabbed his oxygen mask which was fastened to his left shoulder harness and began breathing 100% oxygen. He experienced no immediate symptoms. As none of the crew reported any difficulty, the pilot continued climbing on course.

Pain in Shoulder

Four or five minutes after the decompression, the LT began to feel pain in his right shoulder. However, he did not report this to the pilot. Shortly afterwards, he felt as though his arms were floating in midair and he had little control over them. Simultaneously he lost his peripheral vision. He could see one instrument at a time and read it clearly but could see nothing else. Although he had experienced rapid decompression in the A3D at 41,000 feet on *two* previous occasions and had very recently attended refresher training on the symptoms of dysbarism and the necessity for immediate descent, the LT thought he had *hypoxia* and concentrated on his breathing to prevent hyperventilation.

The LT did not describe his symptoms or their severity to the pilot. He reported only that he thought he was hypoxic. The pilot continued the climb and leveled at 35,000 feet on course.

After repeated attempts over a period of 10 minutes, the pilot was finally able to contact control center. Request for permission to descend was denied because of another aircraft at a lower altitude. Because the pilot was under the impression that the LT was merely hyperventilating, he did not declare an emergency. Altering course to return to the air station, he remained at 35,000 feet for about 30 minutes, then was given permission to descend.

During this time, the LT continued to experience tunnel vision and pain in his right shoulder. He was unable to move his arms and legs. He could not let go of a pencil in his left hand, remove his sunglasses with his right hand or move his foot off the intercom switch. Somewhat later when he tried to raise his right hand, he saw it was moving but had no sensation of motion or perception of his hand's position in space.

Symptoms Subside

As the aircraft descended and came in for landing, the LT's symptoms subsided except for the pain in his right shoulder and mild difficulty in moving his right arm and hand. He began to get a rather severe headache. After the aircraft landed, he noticed that he was sweating profusely. He left the aircraft without assistance and walked to the tower where he requested transportation to the dispensary.

An hour and 12 minutes after the decompression, he was seen by the duty medical officer. Unfortunately this physician was not a flight surgeon and therefore was unfamiliar with the symptoms and seriousness of dysbarism. At the time of medical examination, the LT complained of headache, moderate pain in his right shoulder and some difficulty with fine coordinated movements of his right hand. His vital signs were normal; physical examination was unremarkable. Hospitalization was considered, but the LT stated that he was feeling better and thought that after some rest he would be well and could resume the flight the following morning. He was permitted to go to the BOQ.

At the BOQ he took two aspirin, went to bed and promptly fell asleep. He slept fitfully and during the intervals when he was awake he noted intermittent involuntary slow contraction and relaxation of the muscles in random areas of his body. In the late afternoon, he got up to eat but was not hungry. Feeling worse, he decided to return to the dispensary.

As the LT walked to the dispensary, he was unsteady. His feet slapped the ground and he was unable to sense or control their position. He had considerable difficulty maintaining his balance and several times he nearly fell down. Later, he reported having had an overwhelming desire to burst into tears for no reason. At the dispensary he was immediately transferred to the naval hospital.

Stuporus and Confused

After arriving at the hospital, he became stuporous and confused. His speech was unintelligible and he used meaningless syllables in answering questions. Intermittently he was lucid and would answer with a "yes" or "no." Later when recalling this period, the LT stated that he could hear and

understand the questions being asked by the examining doctors and that he knew the appropriate answers but was unable to say them. Physical examination was normal except for general weakness of his arms and hands, convulsive movements of both ankles, and intermittent involuntary muscle contractions of isolated muscle groups.

Throughout the night he was kept under close medical observation. By morning, his senses were clear and he had no symptoms except a slight headache and some weakness in his right arm. When discharged from the hospital a few days later he was completely normal.

Because of his three decompression experiences, each with progressively more serious symptoms, and because of the likelihood that he would be even more susceptible in the future, the LT was transferred to another command operating aircraft with lower altitude capabilities.

Symptoms Can Vary

Dysbarism is a term used in aviation medicine to cover all the physiological results of exposure to reduced barometric pressure except hypoxia. In the same way in which carbon dioxide fizzes your drink when the bottle cap comes off, gases, principally nitrogen, are released from your body fluids as the atmospheric pressure drops at altitude. These bubbles travel through your system and cause all kinds of symptoms. You may have pains in your joints (the "bends"), a burning severe pain in your chest and an exhausting cough (the "chokes"), or a crawling, itching sensation in your skin (the "creeps"). Your squadron flight surgeon can fill you in on the medical details.

"BENDS" pain from too great a pressure decrease—nitrogen bubbles form in your blood and body fluids
A BOTTLE OF SODA, A DEEP-SEA DIVER AND YOU!
BOTTLE IS CAPPED UNDER PRESSURE
IF DIVER IS BROUGHT UP TOO QUICKLY—
FLYER ASCENDS TO VERY HIGH ALTITUDE
CARBON DIOXIDE FORMS BUBBLES WHEN UNCAPPED
NITROGEN BUBBLES FORM WITH SUDDEN PRESSURE DROP
DECREASED PRESSURE FORMS BUBBLES—YOU HAVE "BENDS"

Dysbarism symptoms can vary considerably among individuals. The older and fatter you are, the more susceptible you are to dysbarism. You are more likely to get it if you have had it before and each time it will be more severe.

The important thing to remember is that if you have reason to suspect that you are experiencing any of the symptoms of dysbarism in flight, an *immediate descent to lower altitude and a landing as soon as possible are imperative.* Whether you are a pilot, crewman or passenger, you should then report to a flight surgeon *immediately* for treatment and observation. The hours immediately following the onset of dysbarism are the most important to prevent shock and neurocirculatory collapse. The symptoms can disappear and then reappear later so don't let yourself be lulled into not seeing your flight surgeon because you feel better. And if you have had dysbarism in the past and are ignoring the possibility of its recurrence, you are gambling against great odds—there is no such thing as developing a tolerance to dysbarism.

The best prevention for dysbarism is preoxygenation before flight. (Actually, "denitrogenation" is a more accurate term for this.) Breathing 100% oxygen for at least a half hour before ascent to altitude reduces the nitrogen in your blood. Then if the cabin pressurization system fails or explosive decompression takes place, you have less nitrogen in your body to give you trouble. Breathing 100% oxygen once the symptoms of dysbarism have started will not relieve the symptoms of dysbarism although it will improve accompanying symptoms of hypoxia.

So, remember:

- Preoxygenate before flight.
- If you experience dysbarism in flight, descend *immediately*—delay may be fatal. Land as soon as possible and report to your flight surgeon. ●

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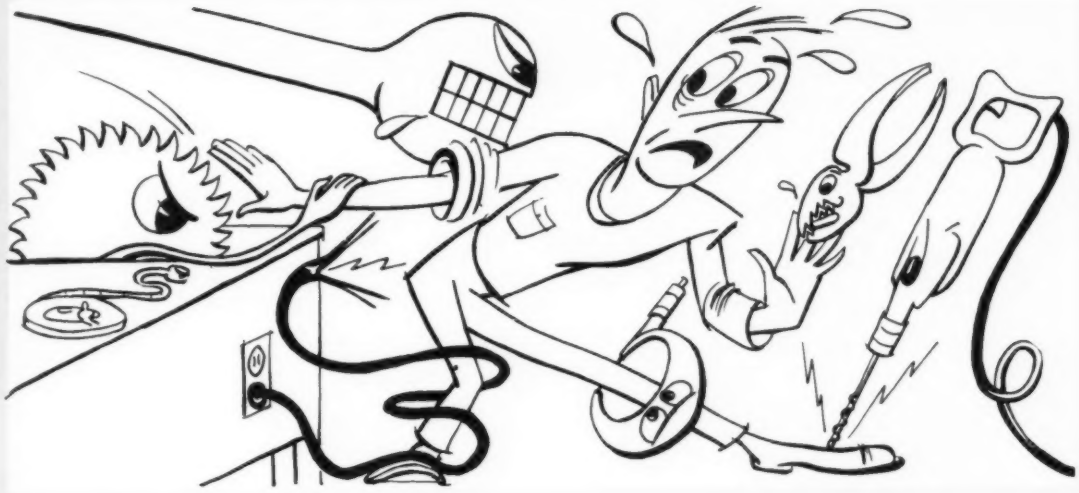


the Trouble with Safety is People

Judging from the stories people tell about industrial accidents, one would think that the tools and equipment we use are alive; that they are aggressive and sinister objects that are ever ready to pounce upon us and inflict injury. Here are a few examples of statements made by injured people:

"A piece of lumber with a nail in it punctured my arm . . . The drill hit the metal plate, causing me to hurt my hand . . . The machine was running and it slammed my hand against a bolt . . . A wire entered my finger . . . Hot slag fell inside my collar and down my body . . . A sharp corner of the metal punctured my finger . . . The hammer slipped off the nut and struck me on the knee . . . The point of a punch went into my hand."

Such statements are in themselves a hazard in that they reveal an attitude wherein people feel that they are totally innocent victims of their surroundings and that there is little or nothing they can do about the causes of injuries that they suffer. This is not true, and such attitudes are conducive to failure in controlling the mechanical aids with which people must work.

The question is a simple one of man versus the tool. Is the man the master or the slave? Can he control his environment and the tools that he uses? The answer, of course, is decidedly yes. Tripping hazards cannot reach out and grab feet. Machines cannot reach out and bite us. Hand tools cannot slice and jab at us all by themselves. For example, if there were no people on the job, there would be no injuries. In the absence of people, the many objects that inflict injury would lie dormant and be unable to move or release any force because the man is not there to start the motion.

In analyzing industrial accident causes, we find that unsafe conditions, by themselves, cause relatively few accidents. Furthermore, unsafe conditions are generally created by people who have acted improperly or who have failed to act as they should have acted. The trouble with safety, then, is people—all of us. The most dangerous thing in the illustration on this page is, therefore, the little man running down the stairs. By his attitude of "accidents will happen" and by his feelings of inferiority to his surroundings, he has become the slave of his environment rather than its master. Maybe the whole idea is better illustrated by the following poem (adapted to fit shipyard exposure).

It's not the wrench that slips and strikes
Or the circuit you thought was dead;
It's not the machine that grabs your hand
Or the stairs with the slippery tread;
It's not the hole that you fall in,
So please don't be misled;
The thing that causes the accident is YOU—
Not using your head.

Safety Review NavExos P-52 ●

CHINSTRAP TRAP

WHEN an F8U-1 pilot ejected over Crater Lake, he lost his APH-5 helmet on impact with the water. He had taken the chinstrap off the helmet when it was issued to him several months before because it irritated his chin when he wore his oxygen mask. Without a chinstrap his helmet rotated during ejection. This loosened his oxygen mask and allowed oxygen to escape. He reported that his bailout oxygen bottle was exhausted at approximately 8000 feet after two minutes of use. When the bailout oxygen bottle was recovered from the lake and tested, no leaks were found.

The reporting flight surgeon made the following recommendations concerning the helmet chinstrap:

- Frequent reminders to all aviators of the importance of an intact and functional chinstrap.
- Periodic checks by the safety officer or flight surgeon to see that all aviators are wearing properly fitted protective helmets with chinstraps attached.
- Padding chinstraps with lamb's wool, soft cotton or foam rubber so they will be less irritating to the skin.

Radio Beacon

THE airfield operations officer advised that a crash drill was recently held utilizing the standard parachute or survival radio beacon to simulate a downed pilot. The radio beacon worked perfectly and aircraft were able to pick up the signal and home effectively. Result was a highly successful drill indicating the potential value of the beacon as a rescue aid.—*2nd MAW-Safety Council Minutes*

Flight Deck Accident

WHILE assisting in respotting aircraft on the flight deck, a tiller bar operator stepped into the line of jet blast from a taxiing A4D. He was knocked down and rolled over and over until he hit the edge of the flight deck. Blown over the catwalk, he landed on the outboard forward edge of the port gun tub sponson and life raft storage bin.

He would have gone overboard if he had been blown a few feet forward. When examined in sick bay, he had only superficial cuts and bruises.

The fast pace of flight deck operations plus the tiller bar operator's own negligence produced this accident.

Free Ride

ONCE in a while a rare case is reported in which parachute wind drag in an overwater bailout is an asset instead of a liability. A pilot ejected from an F8U-1 at 10,000′ above a lake found that a strong wind was billowing his parachute and pulling him toward shore. He intentionally delayed releasing the chute and allowed himself to be dragged over the water for about a quarter of a mile. About 1500 feet from shore he activated his parachute and harness releases, inflated his life vest and climbed into his pararaft.

No Fear of Flying

"ONE of the greatest problems we face in the training command is not so much the student who is excessively afraid of flying as manifest by nervousness, tenseness and the inability to relax, but rather the brilliant student who can do everything except realize that in one of his fearless maneuvers, he may momentarily exceed the limitations of the aircraft he is flying. It is up to each instructor to be continually alert for the student who seems to show little or no fear of flying." This student is an accident looking for a place and time to happen.—*From an MOR*

Inhalation of Vomitus

"THE crew of the motor whaleboat was entirely occupied in handling the craft in a heavy swell." the report of the rescue of an A3D-2 pilot reads. "The pilot, weakened from his exertions followng an underwater escape from his aircraft, was allowed to lie on his back in the boat." While in this position he began to vomit. The subsequent inhaling of his own vomitus contributed to the seriousness of his condition and might easily have caused fatal strangulation had he been unconscious.

Rescue crews should be aware of this extra danger to an exhausted survivor who more often than not has swallowed considerable sea water before rescue.

Bailout Oxygen

AFTER a hard landing aboard the rolling, pitching carrier, an F8U-1 went off the angled deck over the side. Simultaneously, the pilot pulled the face curtain. The seat fired, pilot and seat separated, and the parachute deployed fully just before he hit the water.

On contact with the water, he released his right rocket jet fitting easily, but the left rocket jet fitting stuck. Although he sank, he had no trouble breathing because of his bailout oxygen supply. Inflating his life vest and surfacing, he actuated his left rocket jet fitting with both hands. He released his seat pack, undid the oxygen connection and was picked up by helicopter.

Clearly Visible

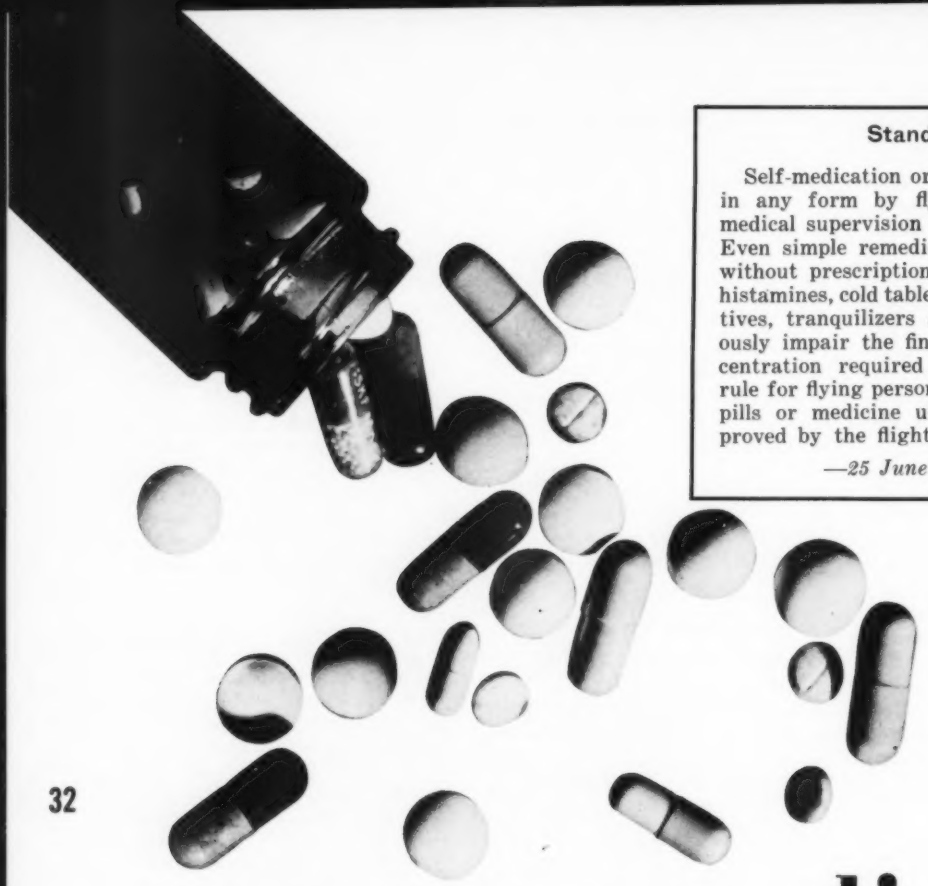
AN F3H-2 pilot who made a successful overwater ejection used two dye markers and a flare to signal his position to the rescuing helicopter. The dye markers were clearly visible from the aircraft at the high cap station (20,000 feet).

G-Forces

YOUR anti-G suit may be the means not only of protecting you against unconsciousness due to acceleration but also from effects which G-forces below blackout level may have on thought processes. A recent research report from the Naval Air Development Center states, "It is generally believed that the central nervous system and hence the cognitive processes are affected by acceleration at levels below those which cause unconsciousness. Consequently, it is hypothesized that intellectual skills, decision making, judgment, prediction, memory, and problem solving are influenced temporarily. . . Past studies have yielded conclusive data indicating that ability to make time judgments and to estimate short intervals of time is impaired by moderate acceleration."

Much more research is needed to identify these effects, the report points out. One such project has been undertaken jointly by the Aviation Medical Acceleration Laboratory and Rutgers University.

All this is one more good reason for wearing your anti-G suit. ●



Standard Rule

Self-medication or the taking of medicines in any form by flying personnel without medical supervision is extremely hazardous. Even simple remedies which are obtainable without prescription, such as aspirin, antihistamines, cold tablets, cough mixtures, laxatives, tranquilizers and the like, may seriously impair the fine coordination and concentration required in flight. A standard rule for flying personnel should be: Take no pills or medicine unless prescribed or approved by the flight surgeon.

—25 June 57 OpNavInst 3740.7

Self-medication

There is probably not a human being in the world who has not at one time or another been the victim of some kind of intestinal or respiratory affliction referred to singly and collectively as "the bug." Whether you get your bug tonic from the local witchdoctor or your corner druggist is largely a matter of tribal custom and geography, but if you happen to be a naval aviator you'd better take your problems to your flight surgeon.

While the Naval Aviation Safety Center cannot definitely prove that self-administered medications have played a part in pilot factor accidents, there have been times when this has been strongly suspected. When accident investigators find antihistamines, APCs, nose drops . . . in the pilot's desk drawer, locker or flight gear, and his family and friends state that he had a cold or an intestinal upset, such evidence cannot be rejected as merely coincidental.

It's dangerous to fly with a cold or to fly with a case of the GIs *but it is much more dangerous to fly with these plus the effects of self-medication.* If you are not well enough to fly without taking medicine, then you should not fly at all until the condition necessitating the medication is eliminated. And the best man to help you is your flight surgeon. Civilian physicians are excellent and well-trained but few of them are aware of all of the medical problems peculiar to aviation. If you are taking medication and you are a pilot or an aircrewman, you should be under the medical supervision of a flight surgeon.

Here is a brief discussion of some of the effects of the more commonly used drugs. Your squadron flight surgeon can probably answer your specific questions.

Antihistamines: Self-medication with antihistamines is particularly dangerous for flying personnel. Response to an average dose of an antihistaminic drug can vary from no effect at all to marked drowsiness, reduced alertness and even mental depression. Antihistamines can adversely affect depth perception and equilibrium and reduce

perceptual motor skills such as eye-hand coordination.

Most of us are familiar with antihistamine tablets and capsules for allergies and colds. It is well to keep in mind, also, that many cough preparations contain antihistamines.

Antibiotics: Since antibiotics are not generally available without prescription, their use by flying personnel can usually be controlled by the flight surgeon. Inclusion of antibiotics in this article is for the benefit of the airman who may be under treatment by a civilian doctor or who might be "doctoring" himself with somebody else's prescription or one of his own left over from a previous illness. Of the antibiotics chloromycetin even when used under medical supervision can damage the body's blood forming system which in turn can adversely affect the oxygen carrying system.

Barbiturates: Barbiturates depress the functions of specialized sections of the brain concerned with the analyzing mechanisms of vision and hearing, the fine coordination of motor movements, and thought and memory.

Tranquilizers: Tranquilizers are used to relieve tension and anxiety. However, work on the problem of stress tolerance has shown that a certain amount of anxiety and awareness has a very definite physiologic benefit in a stressful situation. Caution and good judgment in a potentially dangerous situation is often related to full risk appreciation.

Psychological testing carried out by the Aero Medical Laboratory of the Air Force's Wright Air Development Center on a series of subjects being studied for another purpose revealed highly significant alterations of judgment and orientation to reality while the subjects were on tranquilizers. In this study, neither the subject nor the evaluator knew whether each individual subject was on tranquilizers or not. The experimenters concluded that tranquilizers do not apparently alter the underlying psychological or biochemical difficulty and offer only symptomatic relief. *If the situation demands tranquilizers, the airman should be removed from flying status while on the drug.*

(In the USAF, command flight surgeons establish the policies concerning the period of grounding following the cessation of tranquilizer administration. This varies from 14 to 30 days.)

Narcotics: The word conjures up in the popular mind a picture of a drug addict, a "pusher" and a "fix." However, many commonly used medicines contain narcotics. Among these are common cold and cough preparations and that old standby for intestinal troubles, paregoric. When an airman takes any medicine containing narcotics, *he should not fly.*

Miscellaneous Drugs: Cold compounds which contain quinine can produce ringing of the ears and dizziness. Certain nose drops contain drugs which primarily constrict the blood vessels within the nose, increase blood pressure and pulse rate, and even cause the "jitters." Some nose drops can produce incoordination and visual disturbances. Thyroid extracts elevate oxygen consumption. Some reports have implicated sulfa drugs and analgesics or pain killers such as aspirin as lowering resistance to hypoxia. And no one on flying status should take the so-called "pep pills."

Self-medication is a potentially hazardous undertaking at best. With flying personnel in particular, it can endanger others as well as oneself.

- Commands should conduct a vigorous and continuing education program in support of sound health practices.
- Flight surgeons must monitor and supervise the administering of drugs to pilots and aircrewmen.
- Flying personnel must be aware that taking self-prescribed medicine can impair flying performance with possible tragic consequences. ●

Grounding Recommended

Pilots should not fly in actual control of aircraft while taking drugs, including ataractics, which might affect their physical or mental state adversely. If drugs are administered which have effects that are considered hazardous in the performance of flight duties, the pilots should be grounded until the pharmacologic effects of the drugs have subsided. In support of the above, pilots should be frequently alerted to the inherent danger in self-medication of any type which is not supervised by the flight surgeon.—*Chief, Bureau of Medicine and Surgery*

Ltr to NASC 7 June 1957

Casual Hazards

Pilots who casually indulge in self-medication probably represent a greater hazard to their own safety and to that of the general public than those who are on a long-term therapeutic regimen or applicants who acknowledge that they require drugs intermittently for the control of allergies, or other disturbances that constitute normal health.

—FAA Medical Newsletter Vol. 2, No. 9, 1961

O&R Alameda Teaches...

Quality Control Management

Everitt Knott

"Inspection is a word which must be used with caution in connection with Quality Control," says Everitt Knott, developer of the Navy's Quality Control school located at Alameda Naval Air Station.

Once a given job is done and the "inspector" comes around to take a look, if the job is all wrong, it is too late to control the quality. "In our course we try to stress the need for vigilant control by the mechanic from the moment he starts planning the job until he finishes it," he says.

Included in the course is an analysis of everyday working conditions prevalent in squadrons. There is no idealistic or impossibly-utopian goal set. Knott and his co-workers simply attempt to adapt those principles of Quality Control which will *work* for squadrons.

The need for economy in the Navy has placed a new emphasis on enforcement and development of the principles of Quality Control, according to Knott. He uses this illustration: In the past the Navy might place 12 planes on active duty and hold three to support the squadron. (Figures used are theoretical.) As conditions are now, if two of the Fleet planes need repair, the remaining 10 must do the job of 12. There are no reserve planes available. Now, as never before, the services have had to learn to do the most with the facilities, equipment, and money at hand.

Knott, a member of the O&R Quality Control staff, points out that the nature of private industry differs markedly from that of the Navy. For many years private industry has successfully used principles of Statistical Quality Control in production processes in order to get the most for every dollar spent. Some 30 to 40 years have been spent in developing various ideal systems. In much industrial manufacturing, conditions remain fairly constant, allowing management to plot fairly consistent statistics which, in turn, predict the drift of a given process. On the basis of this analysis, management can make timely corrections.

The situation is entirely different in the Fleet Maintenance activities. Conditions are constantly in flux. First, squadron personnel usually change every two years. Next, there is a multitude of models and types of aircraft which cannot be treated by one set system of maintenance. Missions are different and forever changing. A squadron flies one patrol one day, a different mission the next. And there are different urgencies in workload. One week personnel might work around the clock, next week, they might find themselves surrounded by free hours.

When a man has too much time, he relaxes too much. If he is worked beyond the limit of his capability, he doesn't take time to do each job with painstaking care. In the face of these variables, the operating squadron must adapt Quality Control principles to its own needs, if such principles are to be used at all. The object must be to achieve a more even standard of maintenance recognizing that squadron working conditions will never achieve the comparative placidity of Henry Ford's production line.

To the question "How can Quality Control better fit into our work?" the Alameda course offers this answer: If you are practicing Quality Control in a staff capacity, you may not be able to change the number of flights or change the urgency in getting the flight off the ground, but you *may* be able to advise management to take these actions:

- Improve workload conditions by standardizing specifications and clarifying wording for greater universal understanding.
- Recommend that those specifications which were too rigid at the time they were established be changed when process or use indicates it is economical to do so.
- Establish acceptable quality levels or goals.

Here management should ask "How much am I willing to put up with? If I go lower than a certain level of quality, will the aircraft be unsafe—hence uneconomical? When can I predict that the tires must be changed? After 100 landings? After 150 landings? If I go a few more landings it may reduce the crew's workload. But at the same time, I must change the tires well enough in advance of the breaking point to prevent damage to the aircraft." Safety comes first.

- Create a continuing procedure for analyzing discrepancy trends, keeping written records of these trends, and providing follow-up action to stimulate improved workmanship.
- Influence thinking so as to incorporate principles of Quality Control in each step of the job. Encourage mechanics to help each other by double-checking each other's work as they go along.
- Spot check aircraft. What areas are critical and should rightfully claim the attention of the unit's top mechanic? Which ones are less important and should be placed at the end of the list?
- Make sure the mechanic has all specifications and records needed to do the job.
- Be sure of the crew's physical fitness.

The course, as it stands now, is primarily a management course designed to plan Quality Control procedures. Alameda invites officers and enlisted rates who hold supervisory-type jobs in the squadrons to sign up for the course.

Classroom work is balanced by selected tours of Alameda's Overhaul and Repair Department facilities where extensive aircraft rework goes on—all of which demands constant utilization of Quality Control principles.

Value of the course material is indicated by the fact that Naval Training Publications Center, Memphis, Tenn., has requested the class material as a source for the Group 9 training manual.

Those eligible who are interested in applying for this course should get in touch with their Military Training Coordinator or write to Commanding Officer, Alameda Naval Air Station—Attention: O&R Officer, for quotas and additional information.

Students at Quality Control school, Alameda Naval Air Station, view facilities which are used to check for faulty parts.

Guide Lines for System Inspectors

1. Insure that work order forms, when required have the necessary part numbers, serial numbers and FUR or EFR numbers.
2. Screen previous "B" sheets for repeat discrepancies.
3. Indicate on the work order if the work accomplished requires a test flight.
4. Insure that the items replaced, repaired, adjusted, . . ., are functionally tested. Indicate this on the work order.
5. Insure inspection of *all* maintenance performed in connection with the work order. The work order may call for maintenance on one item in a system, but in the course of troubleshooting, five other items in that system might have been removed and re-installed. It's up to *YOU* to inspect every item that has been replaced, removed, re-installed, adjusted or otherwise worked on in connection with the maintenance.
6. Insure that debris and/or fluid spillage is cleaned up after work is completed. Contrary to popular belief, it is not a function of the plane captain to clean up after maintenance personnel.
7. Use a little imagination while inspecting in regard to where the man that accomplished the work could have left tools, material and hardware lying adrift. Objects left adrift in aircraft become lethal weapons during catapulting and arrested landing.
8. Know the correct maintenance procedures and insist they be followed. Keep abreast of the latest maintenance instructions and directives.
9. Don't let your good judgment be altered by personal considerations, the approach of liberty, operational commitments or personnel trying to "hurry" the job.
10. The purpose of inspection is not to fix blame or to comply with a requirement, but to save aircraft and lives. Efforts made in the area of safety of flight are never wasted—*Contributed by AEW-12.*

MISSING

A single bolt and a cotter pin may seem very insignificant items compared to the thousands of components inherent in the makeup of an aircraft. But their omission, through inadequate maintenance practices, can result in death, injury or the loss of valuable equipment and hundreds of man hours.

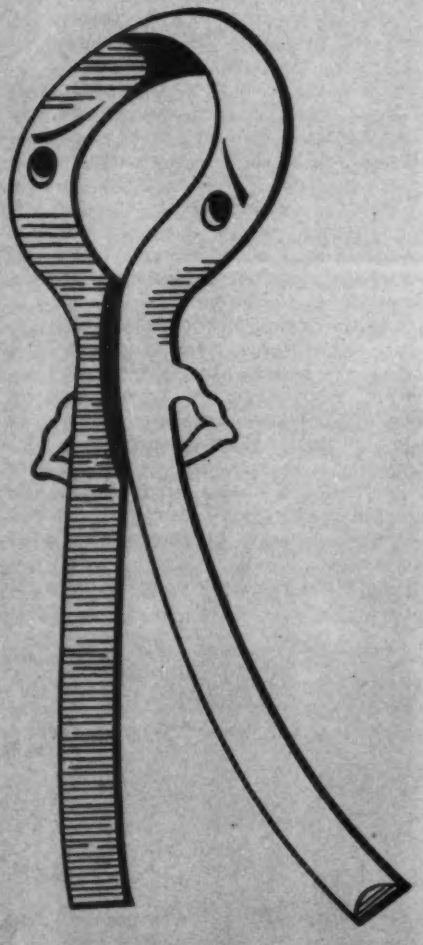
This is illustrated very well in two occurrences, both involving F8U aircraft, which took place within a week of each other last September. In both instances, poor workmanship and a relaxing of quality control inspection procedures combined to cause a malfunction of the throttle controls.

In the first occurrence, the pilot experienced a flameout at 34,000 feet, in straight and level flight at 0.90 IMN, while the engine was operating at 90% rpm. He retarded the throttle to IDLE, extended the ram air turbine and turned the emergency generator switch ON.

At this time, with the throttle in IDLE, the pilot noted the engine fuel pump light was illuminated. He commenced a glide at 220 kts., checked the cockpit to insure that the engine master switch was ON and that there was an indication of fuel remaining in the main fuel tank.

While retarding the throttle to OFF, the pilot noted a definite binding opposing movement of the throttle. At 29,000 feet, with the engine windmilling at 20-30% rpm, an airstart was attempted in the normal fuel control.

When the pilot applied an estimated 25 pounds of forward force, the throttle broke loose from the binding and the throttle control advanced to MILITARY THRUST. As it reached that position, a flameout was simul-



Absence caused loss of throttle control and subsequent striking of the aircraft.

taneously experienced.

Several airstarts were attempted by the pilot before he made a successful flameout approach and landing. The touchdown was normal and, as a precautionary measure, the pilot engaged the chain arresting gear at 40 knots on rollout.

The investigation revealed a safety cotter pin was missing from the engine power control system linkage, which allowed a castellated nut to back off, resulting in a loose coupling in the engine power control system linkage.

A 12-ounce ballpeen hammer was also discovered wedged in the engine compartment near the fuel control. It is suspected that this wedged hammer aggravated the slippage of the coupling assembly and caused the throttle binding noted by the pilot.

According to the board, the mishap is directly attributable to improper maintenance practices and inspection procedures during the major check.

Fortunately, the pilots mentioned here escaped without injury, the latter being able to save his plane. But others have not been so lucky, simply because of inadequate maintenance practices and lack of proper inspection procedures.

The airstart was successful and the engine stabilized at 75% rpm. The pilot advanced the throttle slowly and immediately experienced another flameout. During the time that he advanced the throttle following the airstart, he noted binding in the throttle, approximately halfway between IDLE and full FORWARD.

Three more airstarts were attempted in the normal fuel control and four additional airstarts in the emergency fuel control, all without obtaining any indication of a re-light.

The pilot ejected successfully at 14,000 feet. The F8U was a strike. During the course of the subsequent investigation, it was revealed that throttle linkage separation caused the engine flameout. Apparently, an unsecured bolt had vibrated out of the linkage, allowing the control to become disconnected. This caused the fuel control to vibrate back to IDLE quite rapidly.

The investigation board found through a test that when the pilot retarded the throttle lever, although disconnected, it caught on a portion of the linkage and actually ran the fuel control into IDLE CUTOFF, as the throttle was moved to IDLE.

Moving the throttle forward for an airstart caused the linkage to catch again and pulled the control out of the IDLE CUTOFF to somewhere near IDLE. Thus he was able to get an airstart.

However, continued movement of the throttle completely disconnected the linkage and throttle lever movement no longer affected the fuel control. The control vibrated back into IDLE CUTOFF, again causing an engine flameout.

Investigators found that a steel bolt used to connect the throttle linkage to the fuel control was missing. A nut and cotter pin used to secure the bolt were also missing. They had not been installed on the bolt. (The nut might have been installed only finger-tight, and vibrated off the bolt.) If the bolt had broken at impact, there would have been evidence of this on the portions that it connects.

At the time of the last engine removal for inspection by the shop crew, several other squadron engines were in some phase of removal, inspection or reinstallation. As a result of the heavy workload, the squadron utilized men assigned to the quality control division to assist in performing the work, *instead of inspecting it.*

It had been the squadron maintenance department's policy to send the powerplant section of the inspection sheets to the shops with the engine to be inspected. In this case, the inspection was completed and the engine returned to the squadron. There it was re-installed before the completed powerplant section of the inspection sheets were signed off by the work crew and returned to the squadron.

Due to this fact, the re-installation was performed without reference to the applicable inspection sheets, although duplicates were available.

Although the cover sheet to the powerplants section was completely signed off, indicating all steps had been performed, the shop crew had not initialed the items concerning engine reinstallation.

Prior to flight, the squadron maintenance department compiled all sections of the inspection sheets and checked the cover sheets of all sections, but only spot-checked the contents of the various sections.

The second occurrence was very similar to the first with exception that the pilot was able to save the aircraft.

The F8U had been airborne 1.5 hours conducting intercepts at 15,000 feet. The power setting remained at military power when the pilot reduced the throttle to the idle position. The throttle could not be advanced more than 1½ inches out of the IDLE DETENT due to a spongy binding.

Like Items

DID you ever go into a store and ask for a sure cure remedy by brand name? Did the guy in the white coat say, "Sorry, we're out of Dad's Sure Cure but here's something just as good, maybe better?" Now that's salesmanship. He made the sale with the "like item" pitch.

Substitution does little harm at the corner drug store. Fact is, everyone's happy. The clerk has your money, the folks who make Dad's Sure Cure don't know any better and chances are that your cold went away either because or in spite of the medicine. No one loses.

We have just-as-good or like items in the Navy, too. Sometimes the substitute will work just as well as the original item. Sometimes it won't. Sometimes the results are funny. Sometimes it could kill you dead. Here are a few examples:

A transport lost hydraulic pressure in flight. Following a careful crew briefing on procedure to be used in stopping the aircraft a landing was accomplished. After landing, reverse was used to slow the aircraft and as the end of the runway approached the pilot reached for the airbrake handle. Try as he might *he was unable to move the handle.* Hello boondocks! Goodby nose gear!

Investigation revealed that a conscientious maintenance man, upon finding the air brake handle unsafetied, had corrected the deficiency. Shear wire wasn't immediately available so a somewhat stronger wire was used. It held! This could happen on many of our aircraft. It could happen on firewall shutoff handles, too! Incidentally, the "thinkers" always cut the wire in flight when use of the airbrake is anticipated.

How about T-birds? Oh yes. It happens to them, too. Investigators were searching for the reason behind unexplained flameouts in a T-33(TV) aircraft. The search for a probable cause gradually narrowed down to a flexible fuel line between the engine-driven fuel pump and the quick-disconnect. For a perfect fit this line must be exactly 33½ inches long. The line needed replacement and a "like item" was locally manufactured. Alike except for one minor difference. It was only 30 inches long. What happened? The short line resulted in increased strain on the line, the inner liner separated from the wire reinforcement and pump suction quickly collapsed the line. Fuel starvation and flameout was the result. The lines were identical except for the length.

Recent MATS problems concerning "like items" have centered around C-124 propellers. During go-around from a simulated missed approach the No. 2 prop ran away. The crew was unable to feather or to control the RPM manually and it was determined that No. 2 was developing negative thrust. A forced landing in a cotton field was the result. Investigation revealed that a high speed movable ring gear intended for a B-50 had been placed in the C-124 propeller. The parts look identical but obviously were not interchangeable.

A wire, a valve, a gear or a length of flex hose; the problem can arise anywhere. You no doubt recall many similar accidents or incidents. So what's the answer? Few of these deficiencies can be caught on preflight. But there are actions maintenance men and aircrews can take that may correct the problem.

- Check the parts catalog correct part number. Be sure that number is on the part.
- Place a distinctive marking on look alike items to make correct identification easier.
- Though many of these items can't be noted on preflight, a careful preflight won't hurt.
- When a problem with "like items" that won't work is discovered, sound off. Use the FUR system, submit a FUR or talk to your maintenance officer. Get the word out!

Remember: When two parts look alike and you don't check to see which twin has the Toni, the results may really curl your hair. —*"MATS Flyer"*

JP-4 Never-too-Rich-to-Burn

Fire—explosion—toxic poisoning; these are possible results in handling petroleum fuels without taking the necessary precautions. Yet, when the inherent hazards are taken into account by the well-trained crew, the three risks vanish. That's even true with JP-4 fuel used by jets, although it is constantly at the proper vapor-air mixture for ignition.

However, handling JP-4 does involve more at-

tention to safety than earlier fuel types. The vapors from JP-4 never reach too-rich-to-burn concentration characteristic of other petroleum products. This presents a very definite hazard of flash-back into the tank. It can cause a violent explosion in cone-roof tanks and in partially-filled underground tanks. The ever-present possibility of this flash-back must be impressed in JP-4 handlers' minds.

Following are safety rules to remember in combating the explosive-toxic-fire hazard:

The grounding of the systems must be under constant check to assure perfect ground, and the entire area screened, to assure that every potential source of flame or spark is eliminated.

Usually, the velocity of the flow in the pipelines must be kept at a maximum of 7.7 feet per second—as too rapid or turbulent transfers can cause flash-backs, explosions and fires—but, in filling an empty tank the maximum velocity must not exceed 3 to 4 feet per second.

Extreme precautions must be taken in the repair or modification of JP-4 fuel pipelines and in the entry of tanks for cleaning, modification or repair. All such work must be performed in strict conformance with specifications.

LSD ORIENTATION—Helicopter Squadron 812 checks out in handling aircraft aboard an LSD after the first helicopter landing aboard USS ASHLAND. All hands went through the entire cycle of handling aircraft aboard ship, including complete emergency, fire-fighting and rescue bills, landings and takeoffs.—NAS Minneapolis

Tank-cleaning safety equipment must be given a thorough inspection prior to each day's work. Electric lights and extension cords are potential sources for disaster, and a very thorough inspection . . . must be made. Test every foot of the extension cord for possible indication of failure. Projects for repairing floating-roof-tank seals should be accomplished at the time the tanks are cleaned—only after the tank has been thoroughly cleaned and is vapor free.

With an establishment in which there is cross-servicing of jet and piston-engine aircraft, it is the station safety officer and supervisor to whom we must look for foolproof JP-4 and other fuel transfers. They must be sure men are not looking danger and damage in the face every time fuel moves.—*Adapted from USAF TIG Brief*

The Case of Altered Clues

MAINTENANCE consists not only of replacing parts but aiding in investigations and analyses to determine the causes of malfunctions and failures. It means removing parts carefully, protecting them by whatever means is necessary and wrapping and packaging them well to prevent in-transit damage.

The investigator can only draw conclusions from the clues available to him. If false ones have been introduced, or actual ones have been altered, he either can reach no conclusion or his final solution is likely to be false

A detective investigating a crime looks for clues. Finding enough of them and putting them in their proper sequence, he is able to find a solution and to apprehend the guilty one. A favorite trick of mystery-story writers is to obliterate or alter clues, or to introduce false ones. The logical sequence is broken and the detective is hard put to prove anything.

Investigating failed, damaged or malfunctioning parts from jet engines can follow the same pattern. Consider, for example, a failed turbine blade. If the pieces are handled carefully without damaging the clues, a trained analyst can learn much about the failure. If the clues are obliterated or new ones are introduced, he can only guess. Here is what one such person has to say about the subject:

"The metallurgical analysis of a failed component is a tedious job. Summarily, it involves locating the origin of the failure and determining the mechanism that caused it, as well as the mode of propagation. Much of the analysis is based on the nature of the fracture (intergranular or transgranular) at the failed surface. The fracture surface, then, is one key to failure analysis. Damage to the failed surface in the right (or wrong) spot can obscure the surface sufficiently to prohibit an

accurate analysis of the mode/cause of the failure. In practice, buckets, blades and disks that have been damaged (bent, nicked, etc.) on the failed surface have been submitted for failure analysis."

The damage spoken of here is after-the-fact, that which has occurred from time of removal of the part to the time it reaches the hands of the analyst. It may be bumped with a tool or against another part; it may be dropped or tossed onto a workbench; or it may be improperly packaged for mailing so that pieces hit together or bang against the sides of the box. Any of these poor handling practices may cause enough damage to destroy important clues and to render an investigation next to useless. It's up to you to provide him with nothing but the facts.—*G.E. Jet Service News*

Marking Priority DIR Material

One of the problems in the Disassembly and Inspection Report (DIR) program is that of identifying shipping containers by the receivers. Inspections are delayed because this material is being shipped or stored with materials awaiting regular overhaul. Location of such items is difficult without special marking or identification on the outside of the containers.

All activities wanting priority inspections should conspicuously mark the outside "Material for (Priority) DIR—Deliver to O&R Department," also the item part number and serial number.

The O&R and the BuWeps Fleet Readiness Representative or Fleet Support Representative should be advised of the shipment of the item, the item serial number, and the shipping document reference at the earliest possible date. All paperwork associated with the request for a Priorty DIR should be clearly marked "Material for Priority DIR."

Bull Pup Simplicity-Reliability

BULL PUP was conceived to fill a need emphasized in Korea where American pilots flew more than 225,000 sorties in three years. They struck from 13 U.S. carriers and land bases in Korea and Japan.

There was one drawback. The pilot had to come down low and wade through everything the enemy could throw at him. Bad weather and rugged terrain made his mission tougher. He aimed his bombs or unguided rockets by flying his plane straight at the target until the last possible second. Then he would release his payload and hope to hit the target. The longer he waited before launching his rockets or bombs, the greater his chances of hitting the target. But this was costly; the greater his success, the greater his danger. Sometimes he didn't return. The safety of both the pilot and his aircraft was in great jeopardy.

The net result spoke for itself. It cost too many men and too many planes to hit enemy positions by conventional means. A better method had to be found. The U.S. needed a weapon that would be more accurate than earlier ones and at the same time reduce aircraft losses. Such a weapon should also be simple, reliable and economical. The order was filled on April 25, 1959, when Bull Pup air-to-surface missile joined the Navy as an operational weapon.

As Bull Pup "A" missile began moving into fleet use, the Navy and Martin began development of the larger Bull Pup "B".

With Bull Pup, the pilot doesn't need to fly down enemy gun barrels. He can launch his missiles miles away and guide them to the target while outside effective antiaircraft range. A brief training period assures pilots of high Bull Pup accuracy.

Service officials say, "No other missile in history has approached the reliability of the Bull Pup system." The Chief of the Bureau of Naval Weapons said the Navy made Bull Pup the first operational missile requiring no test equipment. It is treated as another round of conventional ammunition.

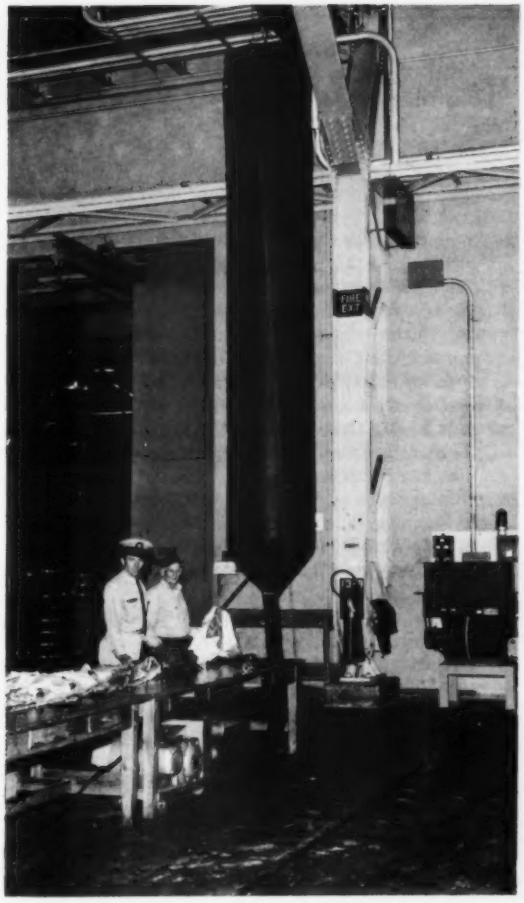
It is reliable because it is simple. By using fewer parts, there is less chance of failure. The fewer parts to go wrong, the greater the reliability. Bull Pup's cost per kill is lower than that of any other missile.

Bull Pup is now deployed by the Navy with both the Atlantic and Pacific Fleets.

(Abridged from the *Reserve Weaponeer*).

Loading drill with a dummy Bull Pup missile conducted by ordnance crew of VA-106.

Chief Jones and Parachute Rigger Curtis pack wet F4H drag chute into drying bag.



Drier bag and chute are suspended from overhead—blower dries chute in 90 minutes.

Drag Chute Drier

RECENT unusually wet weather in southern California posed quite a problem for the VF-121's F4H line. The *Phantom* II is a great all-weather aircraft, but operations could have been seriously hampered by a lack of drag chutes, due to the extended drying time required during the rainy season.

After 4 days of dripping skies and with 17 soaking chutes trying to dry in the hangar, it was apparent that some solution had to be found. A chance remark by Bill Eaton, MAC boss, to Chief Jones, one of the F4H Line Chiefs, about WW II days and how a chute had been dried in Panama, sparked the idea. A quick sketch was made, parts scrounged, and in two days with the skillful sewing help of Parachute Rigger, first class A. A. Curtis, VF-121 was the proud possessor of a chute drying bag.

Used in conjunction with a hot air blower, for curing sealant in integral fuel cells, the previous drying time of over 4 days has been cut to 1½ hours. The bag is 30 inches in diameter, 15 feet long and tapers from 30 inches to 6 inches in the last 3 feet for connection to the hot air blower. An afterburner flame holder is used as a ring on the top of the bag.

Contributed by LT P. W. Kellaway, VF-121 Safety Officer.

Maintenance and the Aircraft Accident Rate

Every maintenance officer and his crew know that the quality of the work they perform on aircraft and other weapon systems will have a significant bearing on the aircraft accident rate. By doing a professional job in every instance they will be contributing to our important objective of reducing the accident rate.

In addition to the knowledge required and the desire to do a thorough job, it is essential for the maintenance crew to use up-to-date technical information to service and maintain aircraft and equipment. Because changes are constant in this super technological age, publications can become obsolete in a short period of time. It is essential, therefore, to check the latest manuals when received.

In addition to his meticulous management of the work force, the maintenance officer should reassure himself that his technical publications are up to date.—*TIG Brief*

"Haste Maketh Waste"

John Heywood said it in the 15th Century, Chaucer said it in the 14th Century, Plutarch and a guy named Publius Syrus said it even before then and (in one way or another) people have been saying it ever since.

A Case in Point: After a record time engine change and further hurry to meet a tight schedule, a small tool box was inadvertently left in the engine inlet and caused foreign object damage to the compressor blades during the trimming operation.

Result: One damaged jet engine, another engine-change and at least two delayed flights.

This is not a preachment against speed and dispatch in our operations—far from it. But as the above incident illustrates, one moment of thoughtless haste can have disastrous consequences.

Schedules are not maintained by rushing into accidents. Very often, "The hurrieder you go, the behinder you get."—*TWA Safety Engineering Bulletin*

Candidly Speaking

"IT seems that there is some doubt whether it was material failure or maintenance error that caused these accidents." This is the candid observation of a Wing Maintenance Officer following the study of recent accident reports within his outfit.

The WMO also noted preventive maintenance and quality control as being in a very low state and recommended that each unit emphasize the importance of these two items and set up a rigid quality control program.

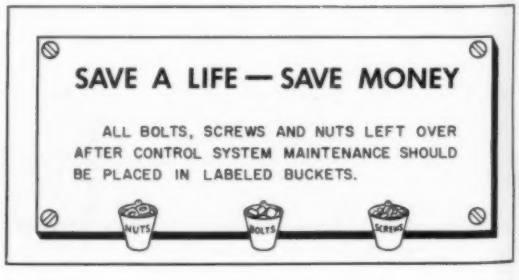
Paralleling the WMO's suspicions is the NASC record of many material failure accidents hinting precipitation by maintenance errors such as improper installation, lack of lubrication or proper servicing. (See MECH '61 recently distributed by NASC). Conversely, the record also attests to dividends earned by those units having effective inspection systems—material-failure as well as maintenance-error accidents have been virtually eliminated.

A4D Air Refueling

DURING an aerial refueling mission, the aircraft backed off from the drogue and through a malfunction of either the drogue or probe, received a burst of JP which was ingested into the engine. When it reached the 13th stage compressor it proceeded through the pressurization system into the cockpit. The pilot was immediately blinded and lost momentary control of the aircraft.

Through feel and instructions from the chase pilot, the pilot was able to regain control and turn off the pressurization. After a time interval he regained vision sufficient to land the aircraft uneventfully.

This incident emphasizes the possible ramification of having such an occurrence on a low level refueling mission and indicates that it may be good procedure to turn pressurization OFF when refueling at low altitude when pressurization is not required.—*El Toro Area Aviation Safety Council*


SAVE A LIFE — SAVE MONEY
ALL BOLTS, SCREWS AND NUTS LEFT OVER AFTER CONTROL SYSTEM MAINTENANCE SHOULD BE PLACED IN LABELED BUCKETS.
NUTS
BOLTS
SCREWS

Escape Systems Quiz

1. What is the installed life of the catapult cartridge, MK, 2 Mod. 1?
2. What are the proper torque loadings for the following on the Martin-Baker Ejection Seat?
   (a) Guillotine Firing Pin Body?
   (b) Primary Firing Pin Body?
   (c) Auxiliary Cartridge Cover Cap?
   (d) Drogue Gun Barrel?
3. The face curtain handle on the Rapec seat should have how many cable turns on the ejection control pulley mechanism?
4. What force is required to release the sticker clips on the Martin-Baker ejection seat?
5. What is the last check to perform before installing the drogue gun barrel?

Answers to Quiz, Page—

1. 2 years. Power Cartridge Handbook, NavWeps Report no. 7836, Errata for, dated 11 January 1962.
2. (a) 180 in. lbs.
   (b) 275 in. lbs.
   (c) 550 in. lbs.
   (d) 160 in. lbs.
3. 4½ turns. A4D. HMI.
4. Approximately 40 lbs. UavAer 13-30-1.
5. Ascertain that the firing pin does not protrude. NavAer 13-30-1.

Aircraft Refueling

DURING the recent BuWeps Comprehensive Survey, several discrepancies were noted in the aircraft refueling operations conducted at this activity. The following highlights are furnished for information and compliance:

► Not more than one aircraft fuel tank filler cap will be removed at any one time during refueling.

► Bonding clamps will not be attached to painted corroded aircraft surfaces. Clamps shall be attached by gripping the surface with "teeth" vice encircling tiedowns.

► Fire bottles must be on hand *prior to* commencement of refueling. A minimum of two 15# CO_2 cylinders or one 50# CO_2 cylinder is required.

► No maintenance work will be in progress during refueling.

► Passengers must disembark from aircraft prior to commencement of refueling.

► Auxiliary ground power units shall not be "plugged in" to aircraft during the refueling, except when the APU is essential to the refueling operation.

► In every occurrence of a significant fuel spill, Fire Department personnel shall be notified. If emergency exists, alarm the Fire Department.

—Alameda Operations Newsletter

Lubrication of Wheel Bearings...

ONE of the major requirements governing optimum performance of landing gear wheels is the use and application of the correct lubricant for the wheel bearings. A number of cases have been reported since June 1961, where wheels of the A3D-1 have seized during taxi-out from the flight line.

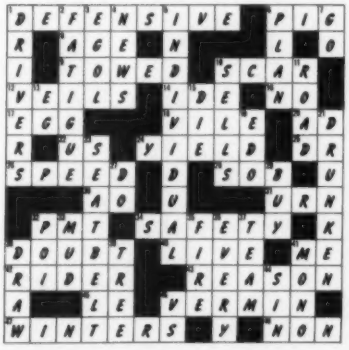
Analysis of greases removed from seized wheels revealed that in almost every instance the bearings had been lubricated with the wrong type of grease, or greases had been mixed.

BuWeps Inst 10350.2 dated 29 November 1961 to all naval aircraft units outlining the correct procedure for lubrication of aircraft wheel bearings. The instructions specify the use of grease (MIL-G-25760) for lubrication of wheel bearings.

Field activities still using the high-temperature grease (MIL-L-3545) on aircraft wheel bearings should change to grease (MIL-G-25760) at the regularly scheduled relubrication intervals as dictated by the Calendar Maintenance Requirements Cards (NavWeps 01-60ABA-6-3). It must be emphasized that before wheel bearings are repacked with the new grease, existing grease or any protection compound must be removed by thoroughly cleaning the bearings in Stoddard dry-cleaning solvent. Under no circumstances shall the grease (MIL-G-25760) be mixed with grease (MIL-L-3545) or any other lubricating grease or protective compound.

Nav Weps 01-60ABB-2-3 dated December 1961 reflects the correct wheel bearing cleaning and lubrication procedures. ●

Solution to puzzle on page 16



Reprinted from approach/may 1959

Curb that Creep!

THERE is a need for a clean-cut understanding of the intent of the time limits specified for Military and Maximum operating conditions. These 30- and 15-minute limits are established on the basis of the engine qualification tests which require these time limits during each cycle of the endurance runs. The limits have been carried over into the flight operating instructions as maximum time limits for these higher thrust ratings. The purpose of these time limits has been to discourage prolonged operation at the high thrust conditions in order to prolong engine life.

In order to obtain a better understanding of these time limits, an understanding of the factors reducing engine life when operating at high thrust conditions must be obtained. High engine rotor speeds increase centrifugal stresses in the compressor and turbine rotating parts (discs and blades). The temperature increases which accompany these high rotor speeds reduce the ability of the heat resistant alloys in the hot section to withstand high stresses.

This material distress with high temperatures is manifested in several different ways. The most important factor is that of *creep*. Creep is defined as the gradual elongation of metal over a period of time while subjected to very high temperatures. This creep is manifested by elongation of turbine blades, as well as buckling and warping of turbine nozzles and combustor liners. In the later stages of creep a turbine blade will rupture completely.

A second factor causing hot section distress which is primarily exhibited in the turbine blades is *stress-rupture*. Each heat resistant alloy has a finite time limit at which it can stand high stresses at specific temperatures prior to complete failure by rupture. This time period is inversely related to temperature (increasing temperature decreases time).

A third mechanism of failure is by fatigue. Fatigue failures can be caused by high frequency vibrations induced by interaction of stators and turbine blades or aerodynamic excitations from the hot gas flow. Fatigue failures can also result from variation of centrifugal and gas loads on turbine blades due to changing thrust conditions.

Another cause of weakening leading to failure is thermal shock stress. Thermal stresses are a result of significant changes of temperature throughout the hot section which cause

The life of turbine blades exposed to thermal shock is reduced from hours to minutes and possibly seconds.

the metal parts to contract and expand accordingly, as determined by their coefficients of expansion. Due to the non-symmetrical shapes and varying thicknesses throughout these parts, contractions and expansions are unequal, thereby setting up internal stresses. The material cracks and distorts in an attempt to relieve these stresses. Although these thermal stresses may not cause failure within themselves they will cause the parts to be weakened and also set up stress concentrations, thereby making a part more susceptible to failure by the other mechanisms.

From the causes noted above, excepting thermal shock stresses, time at a given temperature is the main factor in determining how long a part will last before it must be replaced or fail. Whether a part fails by creep, stress rupture or fatigue will depend on the design and operating environment of the part in the engine. As an example, J57 first stage turbine blades have the governing factor of creep, as the blades will stretch to a certain point. At this time they should be replaced because of the danger of rubbing the case and failing.

On the J33 Series 1 engines of the GMR-235, material turbine blade failures encountered have been by fatigue. The effects of time at high RPM and temperature on the remaining life of a hot section part are cumulative. It is somewhat irrelevant whether this high thrust time is put on the blade all in one period of running or stretched over a long period of service operation of the engine, during which the high thrust running is done in short intervals. Fatigue cracking and distortion caused by thermal stresses, on the other hand, is governed by the amount of starts and changes of thrust in operation of the engine.

In specific reply to the questions asked on the basis of the above considerations, the following is offered:

a. Does the maximum RPM limit of 30 minutes apply to an engine which, at full RPM, is indicating a TOT of only 580°C?

Answer: Research data (National Advisory Committee for Aeronautics) now show that a significant reduction in life of turbine parts is experienced when operating at Military RPM, even with no temperature increases involved, as compared to Normal RPM. Therefore, the 30-minute time limit must apply when either the full RPM or maximum allowable TOT only is reached.

b. To what RPM should the engine be throttled back after 30 minutes at full RPM?

Answer: The effects of time and temperature are cumulative and the hot section of the engine will have a given life at maximum allowable temperature operation whether this time is used up in one continuous period or in several intermittent periods. If the engine were to be throttled back after the 30-minute period at Military with the intent of boosting the engine back to full power again after a short time at the reduced thrust conditions, the main effect on the engine would be to subject the hot section parts to thermal stresses. Therefore, this action would be more harmful than helpful to engine life. The answer here is that if the mission absolutely necessitates operation at Military or Maximum conditions for longer than 30-minutes no action to reduce RPM for only a short period should be taken, as this will be of no help whatsoever in maintaining engine life. Therefore, operation should be continued at the Military RPM until the mission permits reduced thrust.

c. How long must the lower RPM be maintained prior to beginning another period at full RPM?

Answer: It is considered that this question has been answered by item (b). However, it is desired to note here that engine life is roughly inversely proportional to the thrust conditions at which it operated. Research data show that a 100°F reduction in maximum operating temperature, coupled with the nominal reduction in RPM going with decreased thrust operation, may increase the life of turbine blades by a factor of 40 to 50 times. Therefore, for safety of flight and to realize maximum engine life prior to removal of the engine for hot section maintenance, pilots should be instructed to operate at the lowest thrust conditions compatible with mission requirements.

Important factors in jet engine hot section life are overtemperature and overspeed occurrences during starting (overtemperature only), accelerations and steady state operation. The excessive temperatures greatly accelerate metal deterioration due to the effects as noted earlier in this article, while overspeed conditions greatly increase centrifugal stresses. In addition, excessive temperatures may cause metallurgical changes in the alloys, thereby, greatly reducing their ability to withstand temperatures and stresses in future operation of the engine at high thrust conditions. Therefore, it is very important that all occurrences of RPMs and temperatures above prescribed limits encountered in starting and flight be noted and recorded.

Material in this article is based on a BuAer letter clarifying RPM and temperature limitations. These involve a possible area of conflicting overlap in Military and Maximum operation direction of turbojet engines. ●

Miramar

Component Repair Program

A new system of repairing aircraft parts started at Miramar Naval Air Station on May 15, 1960. Called the "Component Repair Program," it is designed to save time and money, by accomplishing the repair of parts at the lowest maintenance level, with minimum out-of-service time. This means getting the work done in the squadron if possible, next by NAS maintenance, and as a last resort, by overhaul and repair facilities.

Although Miramar maintenance and supply personnel cannot truly lay claim to a first in this field, it is felt here that this is the first such effort organized from the beginning as a combined, concerted endeavor by all hands—those in the shops, offices, squadrons and supply warehouses.

James O. Vinson, BuWeps Fleet Readiness Resident representative here presented an outline for the program to Commander H. O. Richards, Maintenance Officer.

A complete set of instructions were written and the necessary forms made up, based on BuWeps Inst. 4408.3. Every person who would be involved was told what would be expected of him.

Since then their motto has become "Repair the Repairable." This means that which can be repaired here will be repaired here, as long as men, materials and know-how are available.

Major advantages already proven in the set-up are twofold:

1. Monetary. Out-of-service time has been reduced as much as three to five months. This means fewer spares are needed. It also means that aircraft availability is improved. Further, higher availability on a large scale could reduce the total number of aircraft required.

2. A Navyman works more in his rate, getting good training and experience. Said Vinson, "It requires greater skill and knowledge to repair components than it does to remove and replace them. Each assembly repaired increases the enlisted man's importance to his maintenance unit."

The system works like this: When a squadron has to replace a part in a plane, an oxygen regulator for instance, they request it from supply.

Supply provides the new regulator and the squadron puts it on the aircraft. Then the old regulator that was removed must be turned in for screening within 48 hours after drawing the new one.

The old regulator is checked at the screening center, and it is determined if the part can be repaired here. If the answer is yes, then a RIM form, Report of Inducted Material, is prepared and the work is done.

After the work is completed, the part is taken to the auxiliary store in hangar K-215, then back to the main supply warehouse to go on the shelves as an available replacement.

The program has been successful and in the future may seem to defeat itself. As the smaller bits and pieces become available, the squadrons will tend to perform more of their own repair and the item will appear much less frequently at "C" level, which is the classification for NAS maintenance. Basically, "C" stands for Component.

A good example of this trend is the case of the F3H *Demon* brake assembly. The usual repair has been replacement of brake discs, a task well within the ability of squadron men. Local units have been very willing to change the discs and keep the brake assemblies in service, but have not been able to acquire the necessary discs.

Large scale demand through the Component Repair Program established a flow of brake discs. Squadrons now are able to draw the discs, make their own repairs and F3H brakes are appearing less frequently at the screening table.

"It might be said that the Miramar Component Repair Program was the first step toward putting Class C maintenance back in the book. Comparing the total Miramar plan with any C maintenance program existing before May 15, 1960; however, shows that it is probably more a matter of originating C maintenance than revamping it," said Commander Richards. "The program is a solid first step, and the date of its commencement may well be looked upon as the start of modern class C maintenance." ●

Repair the Repairable

MURPHY'S LAW*

Engine control quadrant lever spacing washer installed backwards.

A

Forward, Ho!

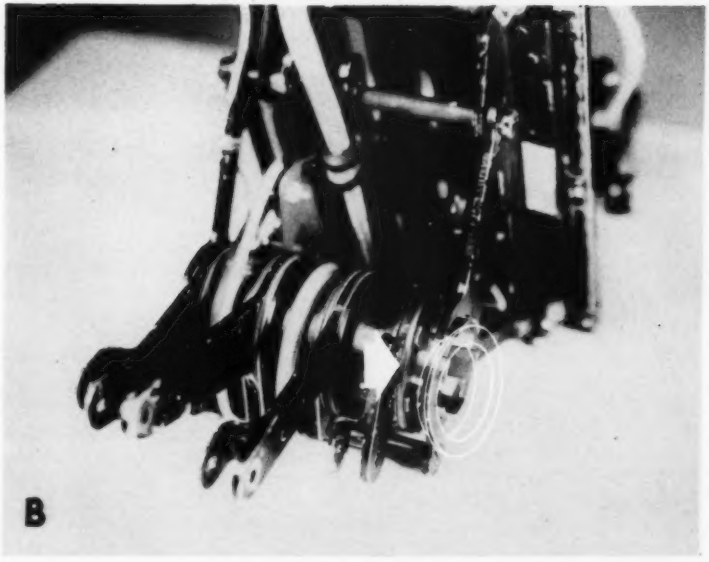
Backwards, No!

Incorrect assembly of an RF1 AD-5W throttle quadrant (5386061-501) caused this Detachment no little consternation and many man-hours. The cause of our trouble was an inconspicuous washer, AN 01-40ALE-4 Section 2; Page 218 Figure 102 index no. 28, installed backwards on the mixture end of the quadrant. The sharp eyes of our Maintenance Chief saved us from submitting a FUR and from being AOCP for several days.

Correct assembly, photo B, of the quadrant allows the pilot to tighten only the throttle and propeller control levers. Incorrect assembly, photo A, brings about many difficulties: The blower control lever is almost impossible to move, while the throttle control lever is almost impossible to tighten. In many instances the mixture control lever moves when the propeller control lever is moved.

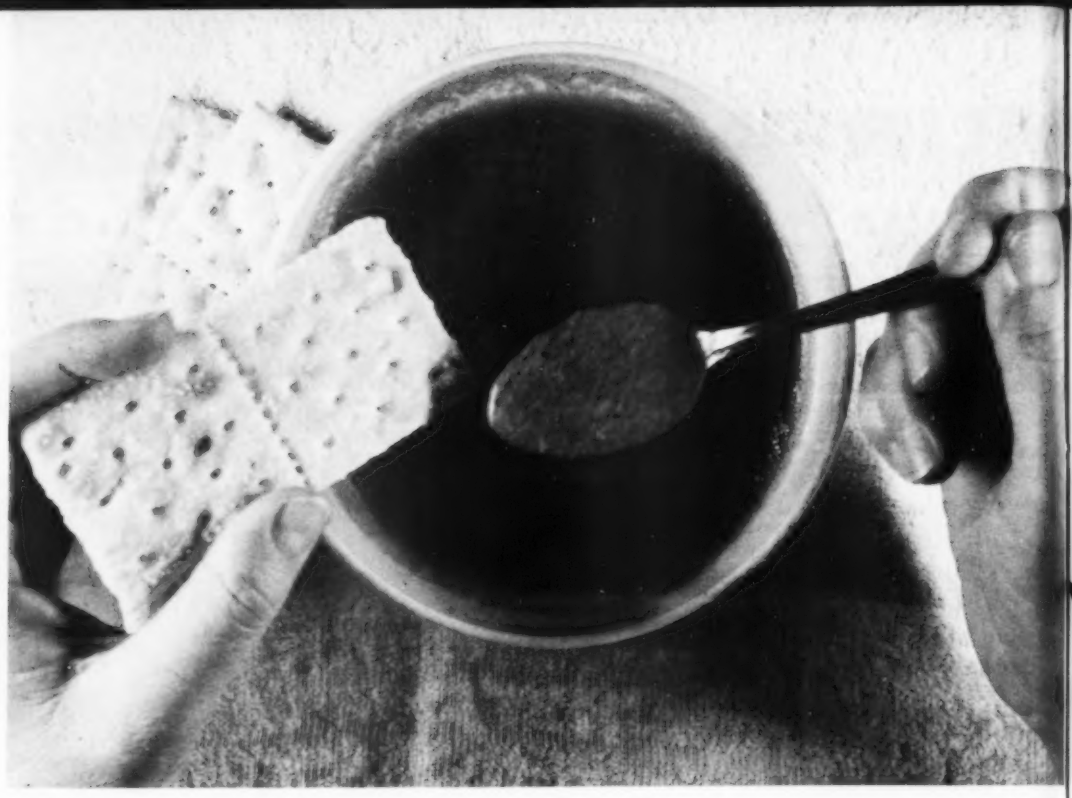
The RF1 throttle quadrant was incorrectly assembled in overhaul. With all due respect to the facility that overhauled this quadrant, this "Murphy's Law" is sumbitted.—*LT A. C. TOMLINSON VAW-11, DET. Q* ●

Spacing washer installed correctly.



B

*If an aircraft part can be installed incorrectly, someone will install it that way!



lift and drag

WE acquire wisdom in two ways: through our own experience, and through the other fellow's. There's an old German proverb that goes:

"He who has burned his mouth, blows his soup."

It is possible, however, to learn to blow our soup *without* burning our mouth—if we will note the experience of somebody who has burned his.

APPROACH philosophy is not to stuff you with statistics but to pass on to you the lessons other people have learned—often the hard way.

We search the experiences of others in order to discover their mistakes as well as their achievements, to find out what has worked, and what hasn't. With these facts, we aim to sell safety through the process of education. Our success is measured in the preservation of lives, equipment and mission-readiness. ●

MUGS IS HERE!

MUGS is there! He's everywhere—the line, flight deck, hangar deck, shop or maintenance crew. Anywhere you find an aircraft you're apt to find this kookie character operating Mobile Unit Ground Support equipment.

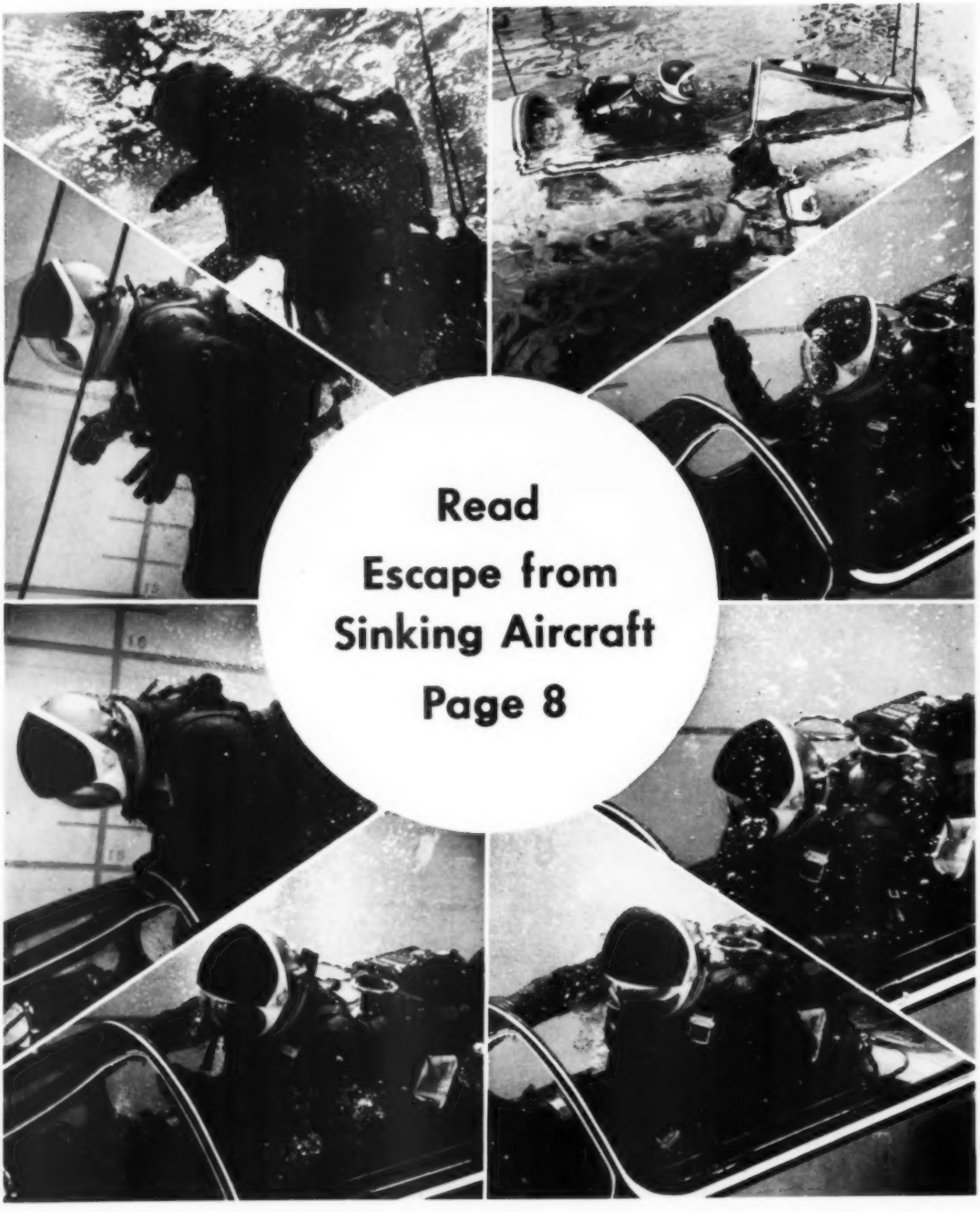
He's the son of Spoiler of WWII fame, a cartoon character who was gumming up the maintenance of airplanes because he lacked experience and horse sense so necessary to keep 'em flying those days. Son MUGS is in the same boat but he's bashing in airplanes with mobile ground equipment or busting up same.

To raise him properly Naval Air Maintenance Training Command is setting up a program to standardize methods of training and licensing requirements. APPROACH is lending a hand by portraying MUGS in "Do's" and "Don'ts" based on reports of actual experiences received by the Naval Aviation Safety Center. By sharing this information it is hoped that a goodly number of crunches will be prevented and a lot of equipment will be saved.

In the past, shore-based and fleet units trained and licensed yellow equipment operators using methods ranging from a basic checkout by another operator to four hours of classroom instruction followed by a written test—often by unqualified instructors or operators.

Now, NAMT, formerly "Mobile Training," will teach instructors and provide them with training aids to standardize qualifications. Potential instructors reporting to NAMT will receive two weeks of instruction—8 hours of instructor training, 32 hours on specific equipment and 40 hours of actual instructing and critiques. Kits will cover equipment as follows: Kit-1—NC-1, NC-5 and NC-7 mobile electric power units; Kit 2—hydraulic test stands, air compressors and liquid oxygen trailers; Kit 3—forklift, crash cranes and tow tractors.

Two detachments, 3032, NAS Norfolk, Va., and 3033, NAS, North Island, San Diego, Calif., will provide training for Atlantic and Pacific fleets. Training is expected to commence during July 1962. Inquiries relative to quotas and eligibility should be directed to the nearest NAMTD. In the meantime—watch for the shenanigans of MUGS appearing regularly in APPROACH. He'll alert you to shenanigans going on here, there and almost anywhere. ●


Read
Escape from
Sinking Aircraft
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